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CONTENTS.

PAGE.

Report of a Case of Polybacterial Infection in Typhoid Fever, with especial Reference to certain Involutions exhibited by the Bacillus Typhosus. By Edward Perkins Carter, M. D., 115

A Case of Typhoid Fever in which the Typhoid Bacillus was obtained twice from the Blood during Life. By E. Bates Block, M. D., - - - - - - - - - - - 119

Successful Cultivation of Gonococcus in two Cases of Gonorrheal Arthritis and one of Tænosynovitis, with Remarks on a New Medium. By Francis R. Hagner, M. D., - - - 121

A New Æsthesiometer. By Lewellys F. Barker, M. B., - 125

Edinger on "The Development of Brain Paths in the Animal Series." By C. R. Bardeen, M. D., - - - - - 126

PAGE.

Pseudo-Tuberculosis Hominis Streptotricha. By Simon Flexner, M. D., - - - - - - - - - - - - 128

Proceedings of Societies:

Hospital Medical Society, - - - - - - - - - 129

Discussion of Dr. Friedenwald's paper on Congenital Motor Defects of the Eyeballs;—Congenital Facial Diplegia [Dr. Thomas];—A Case of Acquired Paralysis of both External Recti Muscles, with Unilateral Facial Paralysis [Dr. S. Theobald];—Exhibition of Ophthalmological Cases: Bilateral Dacryo-adenitis, Operations for Cataract [Dr. Randolph];—Demonstration of Florence's Iodine Test for Seminal Stains [Dr. Lewellys F. Barker].

Notes on New Books, - - - - - - - - - - 133

Books Received, - - - - - - - - - - - 135

REPORT OF A CASE OF POLYBACTERIAL INFECTION IN TYPHOID FEVER, WITH ESPECIAL REFERENCE TO CERTAIN INVOLUTIONS EXHIBITED BY THE BACILLUS TYPHOSUS.

By Edward Perkins Carter, M. D., *Fellow in Pathology.*

[*From the Pathological Laboratory of the Johns Hopkins University and Hospital.*]

The following case seems worthy of publication in view of the opportunity it afforded to study an unusual variation in morphology of the bacillus typhosus isolated from it, and because of the interesting poly-infection with bacteria which existed at autopsy.

The patient, G. C., was admitted to the Johns Hopkins Hospital on October 11, 1896, complaining of fever, weakness and loss of appetite. He had not been feeling well for three weeks, and had been unable to work for the past seven days.

Family history negative. Personal history negative. For the past four years he had led an active out-of-door life, and had up to the onset of present illness enjoyed "good health."

His illness began with a general feeling of weakness, which increased until on Monday, October 5th, 1896, he was unable to go to work, and complained of fever, loss of appetite and pains in the back and legs. He kept up until October 9th, and on October 11th, 1896, when admitted to the ward, he had a temperature of 102.5°, pulse 100 to the minute, and respirations 20. Examination of the blood at this time and at all subsequent examinations was negative for malarial organisms. Examinations of the thorax and heart were negative. Abdomen was not distended. No tenderness and no gurgling in right iliac fossa. Several suggestive rose spots. Spleen was just palpable. Liver dulness normal. The diagnosis of typhoid fever was made and the patient put upon a strictly typhoid treatment.

I have abstracted the following notes from the history of the case, omitting the treatment as being foreign to our purpose.

October 12th, '96, at 7 a. m. The patient had a large semi-liquid stool, containing some formed particles, and a considerable amount of blood fairly bright red in color. At 8.30 a. m. a second hemorrhage, rather brighter red than preceding. Both considerable in amount. Temperature 103.5°, pulse 102.

October 14th. Patient flushed, looks well. Tongue furred,

not tremulous, pulse good. Two fresh rose spots. Abdomen flat, no distension.

October 16th, 1.40 p. m. Hemorrhage, somewhat thick tarry consistence, with some blood clots. Amount of movement about 400–500 cc. 5.30–6.30 p. m., patient had two movements like preceding, quantity same, about 400–500 cc. Pulse very running and feeble. Temperature at 8 a. m. 101.5°, pulse 124.

October 17th. This a. m. condition is distinctly better. Pulse at visit 29 to the quarter. Abdomen not distended and nowhere tender. 11.30 p. m. the patient had a stool of about 250 cc. in amount, which contained blood dark in color.

October 18th, 10 p. m. A stool, about 200 cc., containing blood, no clots. The patient's condition did not show any material change. Temperature at a. m. 102.8°, pulse 120.

October 25th, 2 p. m. The patient had a large movement, 1000 cc. Total amount of blood estimated 500 cc. Temperature at 8 p. m. 101.5°, pulse 148.

From this time, though he had no subsequent hemorrhages, the patient's condition remained critical until his death.

On October 28th he developed well marked signs of consolidation in the lower left back over a small area, and on November 1st the same signs were found in the lower right back.

November 9th. Breath sounds at left base seem almost clear. Percussion at right base impaired, breath sounds distant. Temperature at 8 a. m. 103°, pulse 124.

November 11th. This a. m. pulse 32 to the quarter. The patient passed a restless night, complaining considerably of pain in the left side. Lying on left side, skin moist. Tongue dry and tremulous. Respirations 13 to the quarter. Profuse sweating. Respiration on left side is enfeebled. Back not examined.

The patient's general condition gradually grew weaker and he died at 12.30 a. m., November 12th, 1896. The temperature just before death touched 105°; the pulse was 160.

The autopsy was held 34 hours after death, and the body, apart from slight post-mortem gas development, showed no other distinctive signs of decomposition.

Anatomical Diagnosis. Typhoid fever. Small number of healing ulcers in the ileum; little glandular enlargement. Subacute spleen tumor, parenchymatous degeneration of the viscera, abscess of prostate gland, necrosis of the cricoid cartilage, pneumonia, fibrino-serous pleurisy.

Body 170 cm. long, pale, no œdema. Moderate emaciation. Rigor mortis in both extremities. Abdomen greatly distended, tympanitic and greenish in color.

The spleen weighed 210 grams. It was free from adhesions. On section moderately firm, pale grayish red in color. Malpighian bodies not prominent. Several phleboliths of the size of bird-shot in cut surface.

The small intestine was moderately distended, the mucosa opaque, containing soft fæces. No ulceration until within 100 cm. of the valve, where a small, clear, punched-out ulcer 1 cm. in diameter existed. The surrounding mucosa was congested. No more ulcers found for the next 50 cm., where a large group of coalescent clean ulcers with united edges occurred, which were shallow and rapidly skinning over. These measured 3 x 5 cm. in extent, and the individuals composing the group were hardly larger than the above single one. The most important group of ulcers was located a hand's breadth above the valve; these numbered nine (2.5 cm. in diameter), the largest not much exceeding a silver twenty-five cent piece in size. They were perfectly clean and rapidly healing, judging from the manner in which their bases were filled up; and they appeared to be skinning over at the same time from the edges. The cæcum and appendix vermiformis were free from ulceration.

The larynx on the left side shows a small aperture measuring 1 cm. in diameter, which leads into a cavity in relation to the cricoid cartilage. On dissection a cavity the size of the little finger, lined by granulation tissue, is found, and into the cavity the upper and eroded end of the cricoid cartilage projects. The upper surface gives the impression of being calcified; it is eroded and hard. The contents of the cavity are semi-fluid pus of rather dark color.

In the right lobe of the prostate gland there existed a small abscess the size of a hazel-nut, containing creamy pus. The walls of the cavity are thin and ill-formed. No communication existed with the bladder.

The mesenteric and retroperitoneal glands were little if at all enlarged.

Bacteriological Examination.

Cover-slip preparations made at the time of the autopsy showed from the *pleura* large numbers of streptococci, which occurred in threads of 6–8 segments, and a few long evenly staining straight bacilli.

From the abscess in *prostate gland* great numbers of small thin straight bacilli, which looked not unlike the bacillus of typhoid fever; also numbers of cocci, appearing chiefly in pairs (diplococci).

From the *heart's blood* a number of long straight bacilli resembling closely those seen in the cover-slips from the pleura; also a few single cocci were seen.

Cultures.

Pleura. The agar-agar plate was studded with minute pin-point, finely granular colonies.

Microscopically these proved to be streptococci, which were identified as the streptococcus pyogenes.

Lung. The plate on the same medium resembled identically that from the pleura and contained the same micro-organism in pure culture.

Larynx. The agar-agar plate showed superficially many round grayish brown pin-head colonies, limited to one-half of surface, the remaining area being overgrown with colonies which exhibited a bluish green color. In the substance of the medium were great numbers of small, finely granular pin-point colonies and smaller numbers of large whetstone and irregularly round colonies. This plate being so crowded, a series of plates was made, and from the third dilution the following micro-organisms were isolated and identified: streptococcus pyogenes, bacillus lactis aerogenes and bacillus pyocyaneus.

Kidney. The agar-agar plate was studded with small

round dark granular colonies, much larger than the usual streptococcus colonies. In the substance of the medium there were also a number of whetstone and irregularly round colonies, and on the surface two grayish white spreading colonies and five slightly smaller grayish white more translucent ones. The small granular colonies were composed of the streptococcus pyogenes. From the other colonies two bacilli were isolated and identified as the bacillus coli communis and the bacillus typhosus. (See notes below.)

Liver. The agar-agar plate presented practically the same appearance as that from the kidney, and the same microorganisms were isolated from it.

Heart. The agar-agar plate showed two sets of colonies. The substance of the medium was studded with small finely granular colonies, and here and there a few scattered grayish white whetstone forms occurred, while on the surface there were a number of grayish white, small, fairly round and slightly elevated forms. From the small granular colonies the streptococcus pyogenes was isolated, and from the whetstone colonies in the depth and the round colonies on the surface of the medium a bacillus was isolated which was identified as the bacillus typhosus.

Mesenteric gland. The agar-agar plate showed two superficial, spreading, grayish white irregular colonies, and numbers of whetstone colonies in the substance of the medium. From the plate two bacilli were isolated and identified as the bacillus coli communis and the bacillus typhosus.

Abscess in the prostate gland. The agar-agar plate was studded with small finely granular colonies, and in addition showed a few scattered whetstone colonies in the substance, and several small, reddish brown, irregular, spreading forms on the surface of the medium. From the finely granular colonies the streptococcus pyogenes was isolated. From the superficial colonies a bacillus was isolated which was identified as the proteus vulgaris.

Spleen. The agar-agar plate from the spleen remained sterile after 48 hours in the thermostat.

The bacillus which is, however, of greatest interest in this case is that which was isolated from the heart, liver, kidney, mesenteric gland, and by Mr. Potter from the bile by means of Elsner's method, and which, though it shows great variation upon certain media, must, we think, be considered the true bacillus of Eberth.

Culturally and morphologically this bacillus was proven identical, from all of the above given sources, and our study of it has therefore been made with the cultures obtained from the kidney and bile. At the same time there was carried along with these for control a culture of an established typhoid bacillus. The bacillus isolated from the case under consideration, taken from a 24-hour growth upon agar-agar, is of medium size, straight and thin, with slightly rounded ends, taking the stain deeply and uniformly. It stains with all the ordinary aniline dyes, though most satisfactorily with gentian violet.

The Elsner plates made by Mr. Potter directly from the bile gave what has been and is considered the typical reaction for a mixture of typhoid and colon colonies. The colon colonies were larger, more coarsely granular and more numerous than the small, very pale, transparent and faintly granular colonies from which the typhoid bacillus was isolated in pure culture.

Upon agar-agar plates the colonies of the bacillus under study are small, grayish white in color, slightly elevated and irregularly round upon the surface of the medium, while in its substance they presented the common small whetstone or irregularly round outline. By transmitted light under low power they are of a reddish brown color and faintly granular structure. Upon gelatine plates the colonies are, after 24 hours, small, very finely granular, irregular in outline, and tend to increase in size very slightly during the second 48 hours, thus appearing as typical typhoid colonies.

Agar slant. The growth upon a moderately dry agar tube was, after 24 hours, of a slight, narrow, rail-like character along the track of the needle, being slightly elevated and of a grayish white color. On the moist agar slant it grows somewhat more profusely, covering the surface of the medium more irregularly. This was equally true of the control typhoid culture.

Bouillon at the end of 24 hours is clouded and somewhat opaque. The reaction for indol was negative. In order to establish the certainty of the negative indol reaction beyond a doubt, a culture in bouillon, together with a culture of the control typhoid, and an uninoculated tube of bouillon were placed in the thermostat for three days and then tested for indol, adding at the same time the H_2SO_4 and $NaNO_2$ to the uninoculated tube of bouillon and watching these three carefully for a few hours, and then replacing them in the thermostat over night. When examined the following day all three tubes presented the same appearance, and it could not be said that a true indol reaction was obtained. The test for indol was made again and again without obtaining a positive reaction.

Litmus milk after 24 hours was only faintly acidulated, and reached apparently its greatest degree of acidulation, which is very slight, on the third day. At the end of a month there was no increase of acidulation, as evidenced by the pale pink color which remained quite as noted on the third day following inoculation. Coagulation of the milk did not ensue.

Upon potato the growth bears an extremely close resemblance to the control typhoid. It shows at the same time under the microscope the most remarkable involution forms, which begin to appear upon the third day after inoculation.

If the potato is strongly acid the growth after 24 hours is just visible as a delicate white membrane over the surface of the potato extending from the track of the needle. The macroscopic appearance of the growth remains unaltered, being only just visible after thirty days, while the potato remained undiscolored.

Upon a neutral potato, on the other hand, the growth after 24 hours appears as a slightly yellowish white line along the track of the needle, spreading out somewhat at the base of the potato, being plainly visible and much more luxuriant than is ordinarily true of the bacillus of typhoid fever. After five days the potato itself becomes a very little discolored, while the growth remains unaltered after the third day. At the end of three weeks no further change was noted.

Under the microscope this bacillus shows the greatest variation in morphology, and apparently without relation to the reaction of the potato. After the third day involution forms appear, first as long rods with unstained bulbous ends, and these are quickly followed by the most extraordinary forms, such as long threads, irregular rods with unstained poles closely resembling spores, and shorter oval forms, a picture unlike anything one finds in cultures of the true bacillus typhosus.

Glucose agar. In a deep stab this organism again agrees well with the control typhoid. After 24 hours there is a delicate, small, nail-head growth upon the surface of the medium, while along the line of puncture the growth extends downwards for one-half the distance. This appearance remains in general the same, the growth increasing very gradually until at the end of thirty days there is only a more irregular nail-head appearance upon the surface with a slight growth along the line of the needle stab, thus bearing a striking similarity to the control culture. At no time was there gas formation. Here again under the microscope the cover-glasses made after the third day show the same remarkable involution forms seen in the growth upon the potato.

In a gelatine stab there is a slight nail-head growth on the surface of the medium after 24 hours, extending along the course of the needle for a short distance as a delicate linear growth, and giving identically the same picture as that seen in the control. Liquefaction of 5 per cent. or 10 per cent. gelatine does not occur, and the growth increases very slowly, showing after three weeks a surface growth of the size of the head of a small tack. Microscopically, after the fifth day, we find involution forms in the shape of straight and slightly curved threads, longer by at least twelve times than the bacillus as it appears after 24 hours. The very unusual forms seen in the growth upon potato and sugar agar are not present.

Motility. Hanging drops made from an agar-agar culture of any age always showed great numbers of the bacilli in the field in active motion, but the greatest motility was seen when examined from agar-agar slants of from eight to ten hours' growth; at this age all the bacilli in the field appeared to be in active motion.

It decolorizes by Gram's stain.

Fermentation tubes of glucose, lactose and saccharose bouillon failed to show any development of gas after eighteen days in the thermostat.

The thermal death-point of this bacillus as established by means of Sternberg's bulbs is between 53° and 55° C. at an exposure of ten minutes.

By means of Pittfield's stain the presence of flagella can be demonstrated extending around the entire organism.

Widal's test. Upon adding from $\frac{1}{8}$ to $\frac{1}{12}$ the volume of blood serum obtained from a case of typhoid fever to a 24-hours-old bouillon culture of this organism, a control typhoid bacillus culture and a culture of the bacillus coli communis according to the method of Widal, the following results were obtained:

The control culture and the culture of the organism under study gave characteristic precipitates in the same time, while that of the bacillus coli communis remained unaffected.

A number of tests for agglutination were made by the Wyatt Johnston method, using blood of known activity. The control typhoid bacillus gave immediate clumping, and the organism under study showed a similar reaction in from twenty minutes to one hour.

It is interesting to note that cultures made from potato, sugar agar and gelatine, which showed the involution forms in great numbers, always grew upon re-transplantation as the normal-sized, straight bacilli which were originally met with.

Upon plain agar-agar in bouillon and in milk the growth varied but slightly from what seemed to be the normal.

Animal Experiments.

A mouse inoculated subcutaneously with two loops from a 24-hour agar growth died in less than 48 hours.

The autopsy showed no excess of fluid in the abdominal cavity and no focal visceral lesions. The lymphatic glands were nowhere enlarged. The spleen, liver and kidneys appeared normal. At the seat of inoculation the skin was bound down by quite firm fibrinous adhesions. In the cover-slips from the seat of inoculation great numbers of bacteria were seen. Cover-slips from heart and spleen were negative. Cultures from heart and spleen remained sterile after 48 hours.

A guinea-pig inoculated with 1 cc. of a 24-hours bouillon culture intraperitoneally died after thirty days. The autopsy showed the lymphatic glands somewhat swollen and injected. No excess of fluid in abdominal cavity. Peritoneum perhaps reddened and vessels somewhat congested, but no peritonitis present. Liver, spleen and kidneys appeared normal. Cover-slips from peritoneum and from all the organs negative. Cultures from same sources remained sterile.

A rabbit inoculated with 1 cc. of a 24-hours bouillon culture intravenously was still alive after two months.

We have then a bacillus which agrees culturally with the typhoid organism, which reacts to all the known tests for the true bacillus of typhoid fever, and yet which, after the third day, upon certain media, potato, sugar agar, and gelatine, shows very unusual involution forms; forms so remarkable that were it not for the evidence given by the fulfilment of every test, it would seem impossible to consider this the true bacillus of Eberth.

During the past few years a number of bacilli, found under conditions which would seem to exclude the presence of the true bacillus of typhoid fever, have been isolated and studied by Lösener,* Babes,† Fülles‡ and Cassedebat.§ These bacilli resembled the true typhoid organism so closely in cultural and morphological properties, with the exception of a slight variation in the organisms reported by Cassedebat and by Babes, that it has thus far been very difficult, if not impossible, to distinguish between them and the bacillus typhosus.

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* Lösener, Arbeiten aus dem Kaiserl. Gesundheitsamte, XI.

† Babes, Variabilität und Varietäten des Typhus-bacillus. Zeitschrift für Hygiene, IX, 1890, p. 323.

‡ Fülles, Bacteriologische Untersuchung des Bodens in der Umgebung von Freiburg i. B. Zeitschrift für Hygiene, X, 1890, p. 225.

§ Cassedebat, Sur un bacille pseudo-typhique trouve dans les eaux de rivière. Compt. rend. de l'Académie de Paris, CX, No. 15, 1890, p. 798.

Fig. I.

Fig. II.

Fig. III.

Fig. IV.

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These forms have therefore been designated pseudo-typhoid bacilli.

In addition to the irregular forms described by Babes as seen in growths upon agar-agar, and those in the bacillus studied by Cassedebat, Chantemesse and Widal* have noted certain variations from the normal which appeared as longer thread-like forms upon gelatine, and as straight rods containing irregular vacuoles and unstained poles upon potato. Vilchur† further, in a study made of some 200 cultures from the organs of four typhoid patients, describes variations in form, particularly on old gelatine cultures and upon potato. These occurred as vacuoles which after 72 hours took the stain and then more intensely than the rest of the organism. Aside from these irregular forms I have been unable to find in the literature any reference to such involution forms as are noted in this case.

The growth upon agar-agar in bouillon and in milk showed no variation from the normal, the irregular forms being seen only upon potato, sugar agar and gelatine, as noted above.

*Chantemesse et Widal, Recherches sur le bacille typhique et l'etiologie de la fièvre typhoïde. Archives de Physiologie, I, 1887.

†Vilchur, Cultivation of Typhoid Bacillus from Organs and Evacuations of Typhoid Patients. Vrach, St. Petersburg, 1886, VII, pp. 456–458. Ref. Lancet, London, 1886, II, p. 137.

The control culture used in the study of this case did not at any time show such involution forms as the bacillus under consideration, while culturally the two organisms appeared identical.

It seems therefore unavoidable to consider that this bacillus, which was found in a patient dead of typhoid fever, being isolated from five different sources, and reacting to every test in the manner of the true bacillus of typhoid fever, is, in spite of the peculiar involutions it undergoes, no other than the bacillus typhosus.

In conclusion I wish to express my appreciation to Dr. Simon Flexner for his kindness and interest in the study of this case, and also to Dr. Gray of the Army Medical Museum, Washington, for his kindness in taking the photographs which illustrate this report.

DESCRIPTION OF PLATE.

Figs. I and II. Bacillus typhosus obtained from this case as it appears after a growth of 24 hours upon agar-agar. Zeiss II mm. apochromatic objective, No. IV projection ocular. Gentian violet staining.

Figs. III and IV. The same organism as it appears after a growth of two weeks upon glucose agar-agar. Same magnification. Gentian violet staining.

A CASE OF TYPHOID FEVER IN WHICH THE TYPHOID BACILLUS WAS OBTAINED TWICE FROM THE BLOOD DURING LIFE.

BY E. BATES BLOCK, M. D., *Assistant Resident Physician, The Johns Hopkins Hospital.*

Evidence is strongly in favor of the fact that, at some period of the disease, the typhoid bacillus is present in the blood in nearly all patients suffering from typhoid fever, gaining entrance from time to time at the site of the intestinal lesions. It is the rule for the typhoid bacillus to be cultivated from the internal organs (spleen, mesenteric glands, etc.) after death, and sections of these organs usually show bacilli which resemble the bacillus typhosus, in clumps or masses in the capillary vessels. The early experiments of Wyssokowitsch* show that these organs are principally concerned in removing from the blood introduced bacteria. It was shown by Welch and Nuttall† in 1891 that human blood serum is capable of destroying many typhoid bacilli, and later by other observers that the blood serum from typhoid patients also possesses this power, so that the peculiar conditions which allow these organisms to live in the capillary vessels of the organs cannot, at least in the majority of cases, depend upon a simple loss of this power of the blood serum. That the invasion of the blood or organs by other micro-organisms, more particularly the streptococcus pyogenes, modifies the relation of the patient to the typhoid bacillus, has been clearly shown by Vincent‡ in experiments upon animals and by cultures made at autopsy in human cases. In six out of 31 such autopsies he found the streptococcus associated with the typhoid bacillus. In one case a typhoid patient whose temperature had become normal developed a streptococcus angina, the temperature rose and on the fourth day the patient died. At autopsy the typhoid bacillus and streptococcus were obtained from the organs and the latter from the blood. The streptococcus pyogenes has also been found in association with typhoid bacillus post mortem by Flexner* in 5 out of 6 cases reported, by Wright and Stokes† in 2 out of 9 autopsies, by Klein‡ in the blood, once in association with B. typhosus, by Netter, E. Fraenkel, and others. Karlinski§ has found streptococci in the pulmonary complications of typhoid fever in six out of nine cases, some of them being associated with the typhoid bacillus in the lungs. A similar case is reported by Flexner (*op. cit.*) In forty-one abscesses in typhoid cases examined by Vincent (*op. cit.*) the staph. pyogenes aureus was present thirty-two times, all of these patients recovering. In eight cases streptococcus alone or associated with the bacillus typhosus was met with, and of these, five died. Assuming that in these instances the typhoid bacillus was increased in virulence, it may be said that

*Zeitschrift für Hygiene, 1886.

†Verbal communication.

‡Annales de l'Inst. Pasteur, 1888.

*Johns Hopkins Hospital Reports, Vol. V.

†Boston Med. and Surg. Jour., March–April, 1895.

‡Baumgarten's Jahresb., 1894, Vol. 10.

§See Vincent, *op. cit.*

a similar modification of the physiological characters of the typhoid bacillus infection is produced (Sanarelli*) by inoculating cultures together with the soluble products of the bacillus coli communis and the bacillus proteus.

The clinical history of this case presents points of interest in connection with the bacteriological investigations both before and after death.

M. Z., female, age 30, born in Poland, was admitted to Professor Osler's wards on Saturday the 4th of July, 1896. She could not speak English, so no history could be obtained. Upon admission she was restless, listless, weak, and gave evidence of shortness of breath and abdominal pain, frequently passing her hand over the abdomen. Soon after admission she became delirious. The examination of the thorax was negative. The abdomen was tender upon pressure, and resistant, especially in the splenic area. The pharynx was somewhat reddened and its vessels were injected.

On the 5th of July Dr. Thayer made the following note: Respirations 44 to the minute, pulse 104; patient looks dull and a little confused; the tongue has a thick pasty coat; the lungs are clear on auscultation and percussion; the heart sounds are feeble but clear; the abdomen is full, generally tympanitic, does not seem tender—it is held very tense so that palpation of the spleen is impossible. A number of small spots are seen on the abdomen, some of them apparently ecchymotic, others not unlike rose spots. There is slight cyanosis of the face and lips, which in connection with the rapidity of respiration suggests some pulmonary affection. The patient has had one liquid stool.

On the 8th of July Dr. Thayer noted further: The general condition of the patient is about the same; she is still dull, drowsy, delirious, and quite irresponsive when questioned. There is marked muscular resistance in the splenic region, and pressure here causes the patient to wince. There are no definite rose spots to-day.

The urine did not give the diazo reaction.

The temperature upon admission was 101.2°, respirations 44, and the pulse 120. Three hours later the temperature was 104.6°, and during the fourth, fifth and sixth of July ranged between 101° F. and 104.3° F., the low temperature being due to cold baths, to which she reacted well. From then on the temperature gradually declined and reached normal on the 8th of July. It remained practically normal for about 18 hours. On the following day it rose gradually, the highest point reached being 102.6°.

The respirations during her illness remained rapid and on the 9th of July became more labored, the pulse became more rapid and feeble, and the patient died at 12.45 a. m. on the 10th of July.

On the 5th of July a culture was taken from the stool of the patient, by Elsner's method, with a negative result.

On the 6th of July a hypodermic syringeful of blood was taken from a vein of the forearm with due antiseptic precautions. A few drops were allowed to fall on an agar slant, and the rest of the blood was mixed with melted gelatine and placed in a Buchner jar in the thermostat. The agar slant subsequently showed one colony, while the gelatine tube which contained a greater volume of blood showed about a dozen colonies identical in appearance. Several of these colonies were grown on the usual culture media. They did not coagulate milk, grew characteristically on Elsner's medium; inconspicuous growth on potato with increase of moisture; did not form gas in glucose agar; were actively motile; did not liquefy gelatine, and morphologically resembled the typhoid bacillus.

On the 9th of July a second culture was taken by the same method. The volume of blood obtained was smaller than in the former culture and was allowed to fall on the surface of an agar slant, which 20 hours later showed one colony. Inoculations of other media from this showed the same reactions as in the previous instance. In addition these bacilli did not produce indol; grew anaërobically; did not change the color of Wurtz's medium; gave the agglutinative reaction with over 40 specimens of typhoid blood, and morphologically was identical with the bacillus obtained three days before.

A culture from the throat on the same day did not show diphtheria bacilli; the chief organism found was the streptococcus.

I am indebted to Dr. Flexner for the privilege of making an abstract of the post-mortem examination.

The autopsy was held at 2 p. m. on the 11th of July, 37 hours after death.

Anatomical diagnosis: Typhoid fever; ulceration of small intestine; acute spleen tumor; swelling of the mesenteric glands; parenchymatous degeneration of the viscera; post-mortem invasion of a gas-forming bacillus; œdema of the lungs.

Body cold, has been on ice. No odor of decomposition.

The upper portion of the body shows dark spots and splotches. The face is discolored and swollen. The greatest discoloration is over the back.

Crepitation is present over the face, the neck, the upper portion of the thorax and over the back. The neck is much swollen, thick and discolored.

No œdema and no crepitation of lower extremities.

The abdomen is distended and contains gas which has a somewhat putrefactive odor. The intestines are distended, but not discolored.

The tissues about the kidneys, pancreas, cæcum and the root of the mesentery are emphysematous. The mesenteric and cæcal glands are enlarged, softened and reddened.

The spleen is enlarged and softened, and on section appears dark in color, almost diffluent.

The liver shows many gas bubbles under the capsule, and on section it is found to be penetrated throughout by small gas vesicles, and the blood which escapes from the cut ends of the portal veins is frothy. The organ is pale, homogeneous, and cloudy yellow in color.

Both kidneys are emphysematous, the capsules adherent, the cortex increased, and the striæ coarse.

The duodenum shows many gas cysts. The small intestine shows swollen patches of Peyer; lower down the patches exhibit small erosions. As the valve is approached the enlarge-

* Ann. de l'Inst. Pasteur, 1892.

ment of the patches increases, as does the extent of erosion. Occasionally these patches show hemorrhagic infiltration. At the valve nearly the whole of the intestine is involved in deep ulceration which presents a sloughy and necrotic appearance and is nearly black from imbibition of blood.

The lungs are deep in color, crepitate throughout, and almost sink in water. The cut surface is smooth and dark. The bronchi are dark in color from imbibed blood. The blood in the vessels is frothy. The right side of the heart is enormously distended. On incision there is escape of gas and collapse. The intima of the vessels, and endocardium, are deeply blood stained.

In the right upper angle of the cavity of the uterus is a portion of placenta the size of a walnut, apparently the remains of a recent abortion. It is oval in shape, firmly attached, dark in color, porous in consistence, and has a deep red color. The mucosa is congested.

Cover-slips from the heart's blood, liver, spleen and intestinal ulcer showed, along with other bacterial forms, a large capsulated bacillus resembling closely the bacillus aerogenes capsulatus. These were not seen upon cover-slips from the bile and placenta. Anaërobic cultures were taken from all of the organs, but the large bacillus failed to grow.

Cultures upon agar plates yielded the following results: Bacillus typhosus in placenta, spleen, liver and kidney. Bacillus coli communis in the kidney and heart's blood. Bacillus pyocyaneus in the heart's blood. Bacillus proteus in the bile.

Some of the appearances found at the autopsy must be regarded as due to post-mortem changes, so that the invasion of the bacillus coli communis and the bacillus proteus after death cannot be entirely excluded. It is not improbable, however, that they may have been present in the organs or body fluids during life. The bacillus pyocyaneus is not a common post-mortem invader.

In reading over the available literature I find that the typhoid bacillus has been obtained during life from the blood of patients suffering from typhoid fever by three other writers. Thiemich* found it once in blood taken from a vein of the forearm. Ettlinger* obtained it twice by the same method, and Stern twice.†

Other writers report a negative result. Neuhaus‡ failed in twelve cases from blood taken from a vein of the forearm, and twenty-four cultures§ from blood obtained by pricking the skin of the forearm; Fränkel and Simmonds‖ in six cases. Ettlinger** reports eight negative results with blood taken from the forearm, and Klein ten.†† Failures are also reported by Gaffky, Rütimeyer, Chantemesse and Widal, v. Jaksch, and Vaquez.

In six other cases I failed to obtain the typhoid bacillus, although a syringeful (1.5 cc.) of blood was employed in each instance.

The typhoid bacillus has been obtained from the blood after death by several observers: Vincent,‡‡ Fränkel and Simmonds,§§ Flexner,‖‖ Klein,*** and by Wright and Stokes.†††

Heretofore not much importance has been attached to the work of Letzerich,‡‡‡ Almquist,‡‡‡ Maragliano,‡‡‡ Rütimeyer,§§§ Pasquale,§§§ Guarnierl,§§§ and Karlinski,§§§ because their examinations were made at a time when the differentiation of the typhoid bacillus from other micro-organisms closely resembling it in morphological and biological characters, was not so clearly understood as it is at present. However, it is probable now, that since definite proofs exist of the not very infrequent occurrence of the bacillus typhosus in the blood, either before or after death, their work may come to have more significance.

* Baumgarten's Jahresbericht, Vol. 10, 1894, p. 266.

* Wirtz, Précis de Bacteriologie Clinique.
† Centralb. f. innere Med. 1896, No. 49, p. 1249.
‡ See Wurtz.
§ Berliner klin. Wochenschr., No. 6, 1886.
‖ Sternberg, Text-book of Bacteriology, p. 352.
** Loc. cit.
†† Baumgarten, Vol. 10, 1894, p. 266.
‡‡ Ann. d. l'Inst. Pasteur, 1893; Le Mercredi médical, 17 fev. 1892.
§§ Sternberg, Text-book of Bacteriology, 1896, p. 352.
‖‖ Op. cit.
*** Baumgarten, 1894, Vol. 10.
††† Op. cit.
‡‡‡ Sternberg, op. cit.
§§§ See Flexner, op. cit.

SUCCESSFUL CULTIVATION OF GONOCOCCUS IN TWO CASES OF GONORRHEAL ARTHRITIS AND ONE OF TÆNOSYNOVITIS, WITH REMARKS ON A NEW MEDIUM.

BY FRANCIS R. HAGNER, M. D., *Assistant Resident Surgeon, Johns Hopkins Hospital.*

The more successful attempts to cultivate the gonococcus from pathological conditions other than urethritis and conjunctivitis, have widened our view concerning the part played by this organism in human pathology.

Even now it would take much space to enumerate all the different lesions and parts of the body in which this organism has been found. The gonococcus, as is well known, cannot be cultivated with the facility of the other pyogenic cocci, and it has for this reason not lent itself so readily as an aid to diagnosis in obscure cases, unless perchance it could be found in cover-slips, where its peculiar form and definite staining reaction might suffice for its identification.

Greater experience, on the other hand, has shown that, although this organism does not grow at all, or at least most feebly and unsatisfactorily, upon the ordinary culture media, its choice of substance is still not a small one.

Since Steinschneider's observation of the great value of urine in the composition of a culture medium for the gonococcus, no really easy practicable method of preparing a medium containing this fluid has been devised.

We offer in the accompanying paper a simple method which, in the limited number of cases at our disposal, has proven successful.

It is in part my object in presenting these cases to draw attention to the ease with which, by the use of this medium, the gonococcus may be cultivated.

I must state that the value of the medium was further tested and proven by cultivating this micro-organism from urethral pus. The cases themselves are of interest from their clinical aspects, and as illustrating the good results which surgical interference gives when undertaken in time.

The possibility of making a positive diagnosis before opening the infected joint enhances the likelihood of good which may be confidently expected from these measures.

No question is likely to arise as to the identity of the cocci isolated in these cases, even in view of the fact that in one case the organism did not completely decolorize when treated according to Gram's method.

The later writers on the subject, among whom I shall only mention Caplewski,* concede great difference in the behavior of cocci from different sources.

Most samples of gonococci are quickly and readily decolorized; some few are more refractory and may retain the stain in part. On the other hand, the ordinary pyogenic cocci which resist Gram's method sometimes become decolorized.

No small part in this procedure is played by the composition of the stain and decolorizing agents.

But when all the facts are gathered, namely, the source of the organisms, their morphological properties, their difficulty of culture, and slight viability, together with their staining reaction, no doubt is likely to be entertained concerning their nature.

Case I.

B. B., æt. 21, female, colored. Domestic. Admitted December 5, 1896.

Previous History. Patient has never been very healthy. One year ago she had an attack of rheumatism; at this time the right knee was swollen and painful. The patient was confined to bed for one month, and has never had any trouble with the joint since. There was no history of any vaginal discharge at this time.

Present Illness. Patient acknowledges exposure within the last month. Has had vaginal discharge for three weeks. Six days before entrance to the hospital she noticed pain and swelling of the left knee. Pain more marked at night and increased by motion.

Examination. The patient is a rather poorly nourished, unintelligent woman, with a slight blowing murmur over the apex of the heart, transmitted to axilla. The joint is quite tense, painful on palpation and motion. Patella floats. There is marked induration and thickening of the peri-articular tissues, which are boggy. Distinct fluctuation over the joint. A purulent discharge observed to be present in vagina and urethra. The examination of cover-slips was negative for typical gonococcus-like organisms.

December 5th. Knee aspirated with sterile syringe and a straw-colored fluid obtained; this showed under the microscope a great many polymorphonuclear leucocytes, and a few large diplococci which were not contained in the pus cells. Cultures made on agar-agar, gelatin, potato and bouillon were negative after forty-eight hours in the thermostat. Cultures made at the same time on albuminous urine agar in twenty-four hours showed no perceptible growth, but at the end of forty-eight hours in the thermostat about a dozen isolated colonies, a little larger than ordinary streptococcus colonies, elevated above the surface of the medium, presenting an opaque white color, but still translucent, were easily seen.

Cover-slips were made, stained with Sterling's gentian violet, mounted in water. The examination showed diplococci morphologically identical with the gonococcus. The same specimens were then stained by Gram's method and almost completely decolorized, a faint outline still being visible here and there. The ordinary media (mentioned previously) were inoculated from the cultures with negative results; but another albuminous urine agar tube, inoculated, gave a similar growth to the first after forty-eight hours in the thermostat, and this showed the same morphological characteristics.

Another generation, third in succession, was obtained on the albuminous urine agar medium; this one was feebler than the preceding ones, and no further growth was obtainable.

December 8th. Knee again aspirated, the fluid giving the same growth when inoculated on the albuminous urine agar tube.

The same negative results as described previously were obtained on the ordinary media. The growth mentioned was carried through three generations, but again would not grow on the fourth transplantation.

December 17th. The knee joint was opened and cultures taken, two tubes of the albuminous urine agar being inoculated. One of these became contaminated; in the other the growth was very slight and did not survive for a second transplantation.

The following is a brief description of the mode of preparation of the albuminous urine agar, which was prepared by Dr. Hugh Young and myself.

Acid urine containing 0.05 albumen or more should be collected and allowed to stand for twenty-four hours, no effort being made to prevent decomposition. The urine is boiled until a large albuminous precipitate is formed; it is filtered through paper, when the resulting fluid will be clear. The filtered urine is boiled, and agar-agar, peptone, beef extract and sodium chloride are added in the same proportion as making ordinary agar.

The other steps are the same as in making ordinary agar, except that filtered albuminous urine instead of water is used throughout the preparation of the medium. It is important to see that the medium before being placed in tubes has a neutral or slightly acid reaction.

The advantages of using albuminous urine are, first, that in such urine albumens are always present, which are not coagulated by heat, and second, the albumen that is coagulated acts as a clarifying agent in the removal of the salts that usually cause the cloudiness of urine agar-agar as prepared by

*Hygienische Rundschau, Vol. 6, No. 21, p. 1029.

mixing the urine agar separately and sterilizing by discontinuous heating below the point of coagulation. It is important to have the medium very moist when inoculated.

The operation consisted of opening and irrigating with bichloride of mercury 1 to 1000, followed by salt solution, an Esmarch bandage being applied above the joint to prevent absorption of the bichloride solution.

The wound was approximated with subcutaneous silver wire sutures, silver foil dressing applied, and the leg put up in plaster. Of course very strict cleanliness is necessary in these operations—in all cases the operator and assistants wearing rubber gloves. The wound healed *per primam*.

At the time of operation the subcutaneous tissues were found very œdematous and thickened, and minute hemorrhagic areas were seen in the tissues near the joint. The fluid within the joint was serous in character, although flakes of fibrin were contained in it. The synovial membrane was thickened and its surface covered with hemorrhagic material that in places had a plush-like appearance, having lost its gloss. At the junctions of the cartilages and synovial membrane there were a number of tessellated, very vascular fringes of fibrinous material 3 to 5 mm. in length.

The cartilages showed no change.

The patient is at present more comfortable, but has not entirely recovered.

CASE II.

A. D., female, æt. 20 years, colored, domestic. Admitted August 25, 1895.

No history of rheumatism.

Has had vaginal discharge for two weeks. (Patient acknowledges exposure several days before the discharge was noted.)

Three days before entrance left knee joint became painful and swollen, pain being more marked at night; fever was present, the highest temperature recorded being 103° F.

Examination. Large, well nourished woman.

Left knee slightly flexed, and warmer than adjacent parts. Slight fluctuation on inner side of patella; movement of the affected joint caused great pain.

The peri-articular tissues were indurated and boggy.

There was a purulent discharge from the vagina and urethra that contained diplococci. These were in a manner suggestive of the gonococcus and occurred within the pus cells; they completely decolorized when stained according to Gram's method.

The operation was done on the fifth day of the disease, and consisted in the application of an Esmarch bandage, incision of the joint, irrigation with 1 to 1000 bichloride of mercury followed by salt solution, and closure of wound with silver wire. Silver foil dressing and plaster cast applied.

Patient made good recovery.

The examination of joint at time of operation showed the peri-articular tissues to be in an œdematous and hemorrhagic condition.

The joint contained about 25 cc. of blood-stained fluid in which floated small pieces of a fibrinous material.

The synovial membrane was roughened, thickened and had the same appearance described in the preceding case.

Larger tessellated masses of fibrin adhered to synovial membrane wherever it came in contact with the cartilage.

BACTERIOLOGICAL EXAMINATION.

The fluid for culture was removed from the joint with a sterile Volkman spoon, and placed in sterile test tube. A small quantity of blood was obtained by allowing a stream from a small artery to spurt into a sterile test tube.

The tube containing the blood was allowed to stand for two hours, during which time the serum had separated from the clot and could be pipetted off. An ordinary agar tube was melted and cooled to 46° C., so as to prevent the blood serum from coagulating when added. About 5 cc. of the human blood serum was added, making the proportion one-third human blood serum and two-thirds nutrient agar-agar; the resulting medium was perfectly clear. The fluid medium was then mixed thoroughly, and inoculated with three loops of fluid obtained from the joint, great care being taken not to add the fluid until the medium was observed to be on the point of solidifying, so as to prevent all chances of destruction of the organism by heat.

The inoculated medium was poured into a Petri's dish and placed in thermostat at 37° C. No growth was visible at the end of the first twenty-four hours, but at the expiration of forty-eight hours five or six small colonies could be seen. These were isolated and about the size of the ordinary streptococcus colonies, but they were more elevated when they appeared on the surface of the medium, and of a more opaque white color; they were, however, slightly translucent.

Cover-slips prepared from such a colony and stained with Sterling's gentian violet, mounted in water, showed numerous diplococci somewhat larger than the ordinary pyogenic cocci, composed of two hemispheres separated by a narrow unstained interval; a few tetrad forms were also seen. The same preparation treated by Gram's method was completely decolorized.

Agar-agar, bouillon, potato, gelatin, and glycerine-agar were then inoculated from one of the colonies.

At the same time another culture was made on the serum agar. No growth could be seen after forty-eight hours on any of the tubes except the one containing the human serum agar, and on this a growth similar in appearance to the ones described before, consisting of cocci with the same morphological properties, was found; further transplantation was not successful on this medium.

As no perceptible growth occurred on any of the ordinary cultural media, and cover-slips taken from their surfaces were negative, the conclusion that the organism was the gonococcus was considered justified.

It is interesting to note that although numerous cover-slips were made from the fluid at the time of operation, and numbers of polymorphonuclear leucocytes were found, no micro-organisms could be discovered.

CASE III.

A. F., male, white, single, 39 years. Admitted May 20, 1896.

Denied any venereal disease. (Very questionable.)

Patient felt, without any premonitory symptoms, great pain

in the left ankle joint, and at the same time noticed that there was considerable swelling and redness of the skin over the joint.

The pain was more marked at night, and increased with movement.

The condition mentioned gradually grew worse until the twenty-fourth day after the beginning of the disease, when patient was transferred to the surgical ward.

Examination. Patient was a well nourished man. Temperature on entrance 100° F. There was a fluctuating swelling extending from the juncture of middle and lower third of tibia, following the sheaths of extensor muscles, to a point on the dorsum of foot 3 cm. below the ankle joint.

May 21st, Operation. Same operation as described previously.

Incision of abscess and excision of fibrinous material from tendon sheaths. Irrigation of bichloride of mercury 1 to 1000, wounds closed with silver wire and dressed with silver foil, and leg put up in plaster. Patient made good recovery in three weeks, wound healing *per primam.* On incision the subcutaneous tissues were œdematous and slightly hemorrhagic. The tendon sheaths were thickened and covered with hemorrhagic fibrinous material.

The pus was confined principally to the sheaths of tibialis anticus and extensor proprius pollicis, chiefly about the annular ligament, but followed the pollicis to a distance of 3 cm. below. The sheaths were opened and about 100 cc. of blood-stained fluid escaped, which was placed by means of a Volkman spoon in a sterile test tube.

The internal portions of the sheaths were covered with a hemorrhagic fibrinous material and some granulation tissue.

I am indebted to Dr. Flexner for the privilege of reporting his successful cultivation of the gonococcus in this case. The pus collected at operation in a sterile manner was sent to the Pathological Laboratory.

Cover-slips when stained with Sterling's gentian violet showed polymorphonuclear leucocytes filled with diplococci morphologically resembling the gonococcus; a few of the organisms seen were extra-cellular.

When stained according to Gram's method the organisms were completely decolorized. Inoculations of the pus were made on the mixture of Steinschneider,* on a mixture composed of human ascitic fluid and agar-agar,† on a mixture of human blood serum and urine,‡ on an infusion of pig-fœtuses and nutrient agar,§ and also upon ordinary agar slants. The cultures were placed in a thermostat at 37° C., and at end of twenty-four hours a scarcely perceptible growth was found on all the inoculated tubes except the agar slants, which last remained sterile, whereas the growth on the other tubes increased somewhat during the next twenty-four hours.

The appearance of the growth was the same as that described in previous cases.

Growth on pig-fœtus agar was more abundant and apparently more vigorous than on the other media.

Cover-slips from the cultures showed the same diplococcus as was found in the pus, and it became decolorized completely by Gram's method.

Transplantations at intervals of forty-eight hours were made on pig-fœtus medium mentioned and growth obtained for four generations, but from the fifth inoculation no growth resulted.

It is interesting to note that the condition of synovial membranes and peri-articular tissues in these cases was practically the same, namely subcutaneous œdema, thickening and induration of peri-articular tissues, with small hemorrhagic areas.

The synovial membrane was thickened, very hemorrhagic and had the appearance of plush, having lost the glossy condition.

The fringe-like pieces of fibrin were very hemorrhagic. In neither case was the cartilaginous portion of joint affected.

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*Steinschneider's medium consists of a mixture of bullock's serum, urine, and agar-agar.

†The mixture of ascitic fluid ½ and agar-agar ½, which after being placed in tubes is sterilized and slanted. An albuminous flaky precipitate collects at the bottom of the medium, leaving surface clear.

‡Human blood serum and urine medium is composed of ½ urine, ½ human blood serum sterilized in autoclave at 220° F. (Human serum derived from placenta.)

§ *Preparation of pig-fœtus agar:* Fresh pig-fœtuses not exceeding 5 cm. in length separated from placenta and membranes are minced in a sausage machine. An equal volume of distilled water is added to the finely divided fœtuses, and after thoroughly stirring, the mixture is allowed to macerate in a cool place for from six to twelve hours. The fluid is then freed from contamination by filtration through a Chamberland filter under a pressure of 150 to 200 lbs.

Two per cent. sterilized nutrient agar is then melted and cooled to 40° C. and to it ½ of its volume of the infusion of fœtuses is added. The tubes are then slanted.

NOTICE.

All inquiries concerning the admission of free, part pay, or private patients to the Johns Hopkins Hospital should be addressed to Dr. Henry M. Hurd, the Superintendent, at the Hospital.

Letters of inquiry can be sent, which will receive prompt answer, or personal interviews may be held.

Under the directions of the founder of the Hospital the free beds are reserved for the sick poor of Baltimore and its suburbs and for accident cases from Baltimore and the State of Maryland. To other indigent patients a uniform rate of $5.00 per week has been established. The Superintendent has authority to modify these terms to meet the necessity of urgent cases.

The Hospital is designed for cases of acute disease. Cases of chronic disease are not admitted except temporarily. Private patients can be received irrespective of residence. The rates in the private wards are governed by the locality of rooms and range from $20.00 to $35.00 per week. The extras are laundry expenses, massage, the services of an exclusive nurse, the services of a throat, eye, ear and skin or nervous specialist, and surgical fees. Wherever room exists in the private wards and the condition of the patient does not forbid it, companions can be accommodated at the rate of $15.00 per week.

One week's board is payable when a patient is admitted.

A NEW ÆSTHESIOMETER.

BY LEWELLYS F. BARKER, M. B.

[*Exhibited to the Johns Hopkins Hospital Medical Society, January 18th*, 1897.]

I exhibited at this Society some time ago the test hairs employed by Professor von Frey in studying pain and pressure sense. These consisted, it may be recalled, of short wooden handles of suitable length, to which finer and coarser hairs were fastened at one end at right angles with sealing wax. The most suitable form is perhaps a four-sided wooden handle measuring 4 mm. on each side and 80 mm. in length. Hairs of different strength are obtained from the scalp of men, women and children; hairs from the beard, from the horse's tail and hog bristles are also of service where stronger stimuli are required. The advantage of these test hairs consisted, it will be remembered, (1) in the very small surface of skin acted upon, and (2) in the possibility of grading accurately the intensity of the stimulus applied. In order to test the stimulus-value of the hair, its area in cross section must be determined, as well as the weight which can be lifted by the hair when it is pressed with its cross section against one of the scale pans of a delicate balance. I described on the former occasion the methods of determining these two constants and shall not now repeat the details. Suffice it to say that with time and patience a set of such test hairs can be prepared varying in stimulus-value from 0.1 gr./mm² to 300 gr./mm², though, as Professor von Frey says, the preparation of them is "nicht jedermanns Sache."

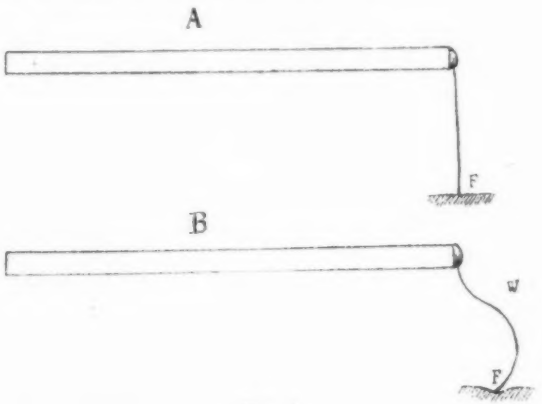

FIG. 1.

The form of the hair and its mode of action are shown in Fig. 1. A represents the test hair when it is placed upon the skin at the point F, though as yet no pressure has been exerted. In B the handle is nearer the skin, through pressure made parallel to the surface of the skin, and the hair is bent into an S-shaped curve, the turning point of which is at W. If W is perpendicularly above the point F, then the hair exerts exclusively an influence of pressure upon the skin; but if W be directed to one side, there arises along with the pressure a "shoving" component. The latter appears, as one finds on bending the hair, as soon as it begins to twist out of one plane; that is, a space-curve arises instead of the plane-curves.

The set of hairs which I pass around were prepared under Professor von Frey's direction in Leipzig in the spring of 1895. I have tested them at intervals since that time and find that they have undergone very little variation. For accurate testing of pressure and pain sense some such delicate testing mechanism is indispensable. Such hairs, however, are not in the market, and I fear if one wished a set of them he would have to prepare them for himself.

Recently, however, Prof. von Frey, with the aid of the mechanician Zimmermann, has prepared a simple instrument which, for purposes of clinical examination at least, will take the place of the set of test hairs. This æsthesiometer, which depends upon the same principle as that involved in the construction of the test hairs, has the advantage that with a single hair one can obtain a large series of pressure-values at will. It consists of a long hair pushed through a capillary tube of very narrow lumen, much like that of a thermometer tube; the hair can be shoved through the lumen easily, but on pressure only the part of the hair outside the capillary tube can bend, and the force exerted is always greater the less the amount of hair outside the tube, and feebler the greater the length of hair not inside the capillary tube. In Fig. 2 the mechanism is shown, though the sample which I pass around has some improvements not illustrated in the figure. The capillary tube consists of a brass tube, S, of very narrow bore, over which a sheath H glides with slight friction. In the axis of the sheath, and of the same length as this, runs a wire, which fits in the bore of the tube S, and at the end of which the test hair is fastened. If the sheath be shoved entirely over the scale the hair projects in its greatest length, and has accordingly only very slight force. On the other hand, if the sheath be drawn back as far as possible the greatest part of the hair

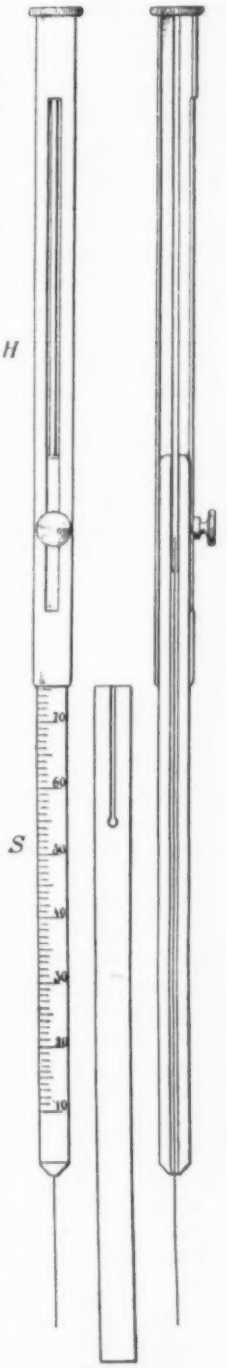

FIG. 2.

disappears within the bore, and the short still projecting part is capable of exercising very considerable pressure force. By means of a screw the sheath can be held firmly in any position corresponding to a test hair of any desired length. There is a millimetre scale on the tube, by the help of which a given length of test hair can always be found again, together with a protecting tube for the free end of the hair to complete the instrument.

The testing of the hair for its pressure values at different lengths can be carried out with the aid of a delicate balance, and if one makes determinations for every fifth or tenth line of the millimetre scale he can easily calculate the values for the intervening lines. With this instrument it is easy to pass from very low pressure values, even below the threshold for the most delicate pressure points, to pressure values above the pain threshold in parts of the body where the pain threshold is high.

The value of this instrument was demonstrated with Dr. Cushing in the ward the other day. In a case in which ordinary slight stimuli appeared to call forth pain constantly, the idea had arisen that pressure sense was absent, the pain sense being very much exaggerated. It was easy with this instrument to show that the pressure sense was not abolished, though the threshold for pain was almost at the same level as the threshold for touch. With care, however, the pressure points could easily be made out. The significance of careful examinations in such cases is obvious, for it would be easy for the clinician to make the statement that tactile sense was destroyed in a given case in which in reality it was unaffected or but little affected. If such a case should come to autopsy, one might be entirely misled in interpreting the lesions found.

The æsthesiometer is not expensive, costing I believe five marks, when purchased from E. Zimmermann of Leipzig. I cannot recommend it too highly for use in clinical examinations.

EDINGER ON "THE DEVELOPMENT OF BRAIN PATHS IN THE ANIMAL SERIES."*

[Abstract of a Report made by C. R. Bardeen, M. D., before the Journal Club of the Johns Hopkins Hospital.]

In this address Edinger speaks in a most interesting way of the value and possibilities of a comparative psychology based on careful biological and morphological study. He himself, he says, was led to undertake this line of research by the knowledge that the lowest vertebrates have no cerebral cortex. In man and in the higher vertebrates the finer conscious activities take place in this part of the brain, and in the ascending vertebrate series there is a gradual development of the cerebral cortex up to man. "Indeed, in man," says Edinger, "the evolution of the brain cortex is still under way." The interesting questions arose, What nervous activities are possible in animals without a cerebral cortex? and What nervous and mental activities have been added as the cortex has been evolved in the animal series? The solution of these questions involved the broader task of studying the finer structure of the nervous system of the lower vertebrates. It was found on investigation that those parts of the brain which, as opposed to the cortex, are designated as the "lower parts" are essentially similar in all vertebrates. The spinal cord and medulla of the fish and of man do not differ fundamentally.

"So far as we know to-day," says Edinger, "we may ascribe to similar structure similar function." If this be true we may hope by careful study of the morphology of the nervous system to have opened up new points of view for physiology and psychology. If to the spinal cord, for example, the functions of which are well known, comparative anatomical study shows that other structures are added little by little, we may suppose corresponding additions in functional capacity.

Edinger lays special stress on the need of care in forming our conceptions of the operations of the nervous system of the simpler animals. We must carefully rid ourselves of all preconceived notions of perception and desire as the necessary accompaniments of complex reactions to stimuli. We have, he says, no grounds for belief that such states of consciousness arise outside the higher centres of the cerebrum. We have no right to assume that in the lower animals the simpler nervous system performs functions like those performed by the higher centres of the nervous system in the higher vertebrates. "I trust I may be able to prove," says Edinger, "that the latter assumption, so commonly made, cannot be maintained."

To show how easily one might falsely attribute a conscious origin to complex movements, two or three examples are given from the invertebrate kingdom. Loeb's interesting experiments with the actinia are quoted. If a bit of fish be placed on the tentacle ring of one of these animals the tentacles close in and force the food into the mouth between the tentacles. But a piece of white paper put in the same situation is left undisturbed. This at first sight might seem a voluntary choice between the food and the paper, involving a conscious perception of taste. But if the mouth be destroyed and the bit of fish be again put on the tentacle ring the actinian will double itself up trying vainly to force the morsel into the closed mouth. The definite activity caused by the meat is, roughly speaking, a direct reaction of the tissues to a chemical stimulus. The actinian has no very definite nervous system, though certain of its cells are taken to represent nerve cells.

Edinger also refers to the recent studies on the nervous

*"Die Entwickelung der Gehirnbahnen in der Thiereihe," delivered before the medical section of the "Gesellschaft deutscher Naturforscher und Aerzte," in Frankfurt a. M., Sept. 23, 1896, and reported in the Deutsche medicinische Wochenschrift, Sept. 24, 1896, Vol. XXII, No. 39. [Prof. L Edinger of Frankfort is well known in America as the author of a very lucid text-book on the structure of the brain, "Der Bau des Gehirns." He is perhaps the foremost worker in the line of research of which he speaks in his address.]

system of the earth-worm. Thanks to the work of Loeb and Friedlaender on the living earth-worm, and that of Retzius and von Lenhossék on the morphology of its nervous system, the task of comparing its structure with its psycho-physiological activity has been greatly lightened. If the earth-worm be cut into pieces not too short, and one of the pieces is stimulated to move, it will continue creeping. The movement is produced as follows: from large epithelial cells in the external skin the earth-worm's sensory fibres pass into the central ganglia situated in the ventral band; here the process divides into at least two parts. These lie in contact with the dendrites of large ganglion cells lying in this ganglion and in those immediately adjoining. These large cells send processes to the muscles. Each ganglion sends motor fibres, not only to the muscles of the segment within which it lies, but also to those of the neighboring segments. Some of the fibres cross the median line. A third set of cells have processes which run up and down the ventral band connecting different ganglia. Thus a sensory impulse started in a large epithelial cell is carried to the neighboring ganglion. Here the motor and associative cells are called into activity, and the muscles in the vicinity of the segment whose surface has been stimulated contract. This throws increased tension on the surface of the neighboring segments and they in turn are stimulated to contraction. A contraction wave is thus started along the worm, called forth by simple reflex action. This scheme is not diagramatic; it is based on the actual observations of trained observers.

The mechanism which controls intestinal contraction in the higher animals is very similar.

The nervous mechanism found in the vertebrate spinal cord is fundamentally the same. Here again we find motor cells sending processes to the muscles; here again processes from sensory cells terminating in gray matter; here again, but in a far more developed degree, association neurones. That the spinal cord is capable, unassisted by the higher centres, of carrying out very complex movements is shown by the complex activity of the frog deprived of a cerebrum, the jumping of the brainless rabbit and the swimming of the brainless goose.

The morphological structure on which the functions of the spinal cord depend has now been fairly well determined. Beside the factors already mentioned there enter into its structure paths connecting it with the brain. In the fish paths connect mid-brain and cerebellum with the spinal cord. Connections between the cerebrum and the spinal cord first appear in mammals. "The direct influence of the cerebrum on the activities controlled by the spinal cord varies, therefore, according to the class of animal, and it does not even exist among the lower vertebrates." The pyramidal tract is not found in birds.

The medulla, while, like the cord, serving as a primary centre for the reception of sensory and the origin of motor fibres, has a much more highly developed associative mechanism than the cord. Yet the development of these paths of association varies greatly in different animals. In the carps and many other fishes it has a more complex development than in man. The complexity of development of the medulla depends chiefly on the uses to which the cranial nerves are put. The terminal area of the fifth nerve, so well developed in the sensitive-faced mammals, is but slightly developed in the snakes, but the motor area of the fifth nerve in snakes is relatively more developed than in the mammals, owing to the snake's powerful jaw muscles.

The cerebellum varies greatly in development, even among the fishes. Those that swim actively have it more highly developed than the mud-seeking varieties. Birds being animals of delicate sense of balance have it well developed. In snakes it is very rudimentary. Whatever the functions of the cerebellum may be, this organ is well developed in all animals executing carefully poised movements. The hemispheres of the cerebellum first appear in the mammals.

The connections of the cerebellum with other parts of the central nervous system are interesting. The pons fibres first appear in the mammals, and it is probable that the olivary paths do not occur in the lower forms. On the other hand the connections with the spinal cord through the corpus restiforme and with the thalamus through the superior cerebellar peduncle are primordially old. The latter are more highly developed in fishes than in man.

Next to the spinal cord the mid-brain is that part of the central nervous system most alike in all vertebrates. It is the primary terminus for the optic fibres, and in it end a large part of the secondary sensory fibres transmitting impulses from the other sense organs. It is the great centre for the association of sensory impulses in the animals without a well developed cerebrum.

The cerebrum in all vertebrates is composed of olfactory apparatus, basal ganglia and cortex.

The olfactory region varies greatly in development. In reptiles and in fishes it makes up half the brain mass. In birds it is scarcely to be traced.

The corpus striatum, which lies just behind the olfactory apparatus, appears developed throughout the vertebrates. It plays a chief part in connecting thalamus and fore-brain, but in large part its functions are ill understood. The optic thalamus is likewise complexly developed throughout the vertebrates. The cortex stands in marked contrast to the lower parts of the central nervous system which are so much alike among all the vertebrates. In fishes the cortex consists of a thin epithelial plate. In the amphibia it contains a simple nervous apparatus. In reptiles a true cortex appears for the first time.

Within the last twenty-five years it has been definitely shown that the cortex performs the highest functions of the nervous system. On the existence of a normal cortex depend all those functions which may be learned, almost all which are carried out by memory pictures, and, above all, those complex conscious processes designated "associative." The silver stain has shown into what a complexity of relations each nerve cell is brought by its processes. From the reptiles to man this associative complexity increases.

It seems probable that various sensory areas in the cortex have been added as the need has arisen for more highly developed associative processes connected with the special senses.

The earliest cortical relations are with the sense of smell

only. Reptiles, we may assume, differ from fishes in that they can "retain their smell impressions, associate them and choose." For the reptile the cortex is an olfactory centre and out little more.

"This first inheritance of the cortex, the olfactory centre, remains throughout the entire series; in birds alone is it somewhat uncertain. There is no difficulty in following the cortex of the reptiles into the Ammon's horn and the uncinate gyrus of mammals and man."

But in the course of evolutionary development other brain centres have been added to this; the cortex has been built up piece by piece. Unfortunately most of the steps are still uncertain. Something is, however, known of the optic paths. In fishes the optic nerve ends in the mid-brain. And so too in man at birth the only functional fibres end there. The babe is not blind, but it has no association centres for sight impressions. During the second month of life paths are developed from mid-brain to occipital lobe, the cortical sight-centre is called into activity, and association paths are formed between it and the rest of the cortex. The child only then begins to perceive what it sees.

It is because the fish has no cortical centre for sight that it can be hooked. To a similar reason is due the fact that reptiles and amphibia often go hungry when they do not smell their prey and it does not move. Snakes which do not eat dead mice will seize and devour, without a trace of dislike, dead mice artificially made to move.

Birds have a well marked cortical area for sight, and hence they exhibit many phenomena which indicate reason and memory founded on sight impressions.

It is clear, however, that in the lower animals many functions are performed without the influence or control of a cortex, and the question naturally arises as to the real nature of the functions of the lower centres. It is well known that man and the higher mammals are more injured in normal activity by loss of the cortex than are the lower vertebrates; that the cortex becomes indispensable in proportion as it becomes well developed and is brought into close association with the lower centres. This has been shown by the study of the diseased human brain and by experiments on animals. But nature offers us animals with no cortices and with cortices variously developed along special lines. We have here a beautiful opportunity to study the functions of the cortex in the animal economy. Most interesting points of view might be obtained by excitation of the olfactory nerves of fishes which have no cortical centres, and of snakes which have cortical centres for smell; or by comparing the effects of visible objects on snakes which have no developed associative centre for sight, and on birds which have them well developed.

And this same sort of study carried to man will also prove productive. The great man need not necessarily have a heavier brain than the average man, but we should expect that part of his brain which he had occasion to use to be better developed than the average. The great painter should have a well developed occipital lobe; the great musician a well developed temporal lobe. Gambetta's brain was not above the average in size and weight, but the speech area was very greatly developed. For the present, Edinger points out, we may willingly refrain from speculating about convolution anomalies and criminal types. More fruitful fields of investigation are offered the scientist. The field of comparative psycho-physiology and comparative morphology gives every promise of being most fertile. One thing seems sure, "there is no boundary to be established between the conscious activities of the lowest and those of the highest vertebrates."

PSEUDO-TUBERCULOSIS HOMINIS STREPTOTRICHA.

[A PRELIMINARY NOTE.]

By Simon Flexner, M. D.

[*From the Pathological Laboratory of the Johns Hopkins University and Hospital.*]

At the meeting of the Johns Hopkins Hospital Medical Society held on October 19th, 1896, I presented specimens from the lungs and peritoneum of a man who had succumbed to a disease characterized by symptoms which resembled those of phthisis pulmonum, but in the lesions of which, instead of the bacillus tuberculosis, another and probably entirely distinct micro-organism was discovered, for which I have proposed the name of streptothrix pseudo-tuberculosa. As the publication of the full report of the case and the complete description of the micro-organism has been somewhat delayed, a brief outline of the case may be of interest at the present time.

The patient was a male, colored, aged 70 years, in whom extensive consolidation was made out in both lungs. The symptoms were generally those of pulmonary tuberculosis. Sputum was carefully watched for during his stay in the Hospital (Dr. Osler's clinic), but none was obtained. No microscopical examination could therefore be made.

Autopsy. The body was that of a slightly built, somewhat emaciated man. The abdomen was moderately distended. The autopsy was made 19 hours after death, the body having in the meantime been kept on ice. No evidences of post-mortem decomposition were noticeable. The description of the viscera is limited here to the organs especially affected.

The *Lungs* are voluminous and meet in the middle line anteriorly. They are not bound to the chest wall. *Left.* The entire lung, except the anterior edge of the upper lobe, which is insufflated, is consolidated more or less perfectly. Where the consolidation is frank the lung presents an opaque appearance, is gray in color, and beginning softening (disintegration with early cavity formation) is going on. The cavities often

still contain the products of disintegration, and all appearances of reactive encapsulation are wanting. Where the hepatization is less complete the lung tissue is œdematous and swollen, although perhaps not completely airless, and discrete tubercle-like nodules may be seen. The pleura over the hepatized areas is covered with a fibrinous exudate. *Right.* The consolidation is less extensive and more focal in character, but occupies in places areas as large in extent as 4x5 cm. The pleural cavity contains a small quantity of fluid, pink in color, in which flakes of fibrin occur.

The intestines are moderately distended. The omentum is rolled up; it occupies a position beneath the transverse colon and extends across the abdominal cavity. The pelvis contains about 15 cc. of fluid of brownish color and mucilaginous consistence. Between the intestinal loops delicate shreds of fibrin exist. In addition smaller and larger nodules resembling tubercles, usually translucent, are scattered irregularly over all the exposed peritoneal surfaces, and occur more uniformly upon and within the thickened, rolled-up omentum. The liver and spleen on section show similar nodules.

The bacteriological examination consisted in the study of cover-slips from the fresh lungs, the inoculation of glycerine-agar tubes, and the injection of a suspension from the consolidated lung subcutaneously into a guinea-pig. The histological study embraced all the organs of the body. Cover-slips from the lungs, stained by Gabbett's method, showed no micro-organisms which resembled the bacillus tuberculosis in their morphology. There remained faintly stained in carbol-fuchsin upon the cover-slips numerous examples of a branching organism, occurring often in clumps or convoluted masses, among which no ordinary bacillary forms were discovered. From the history of the case, the character of the lesions and the known variation in morphology of the bacillus tuberculosis, it was, for the time, assumed that the organism was a streptothrix form of the former bacillus. Its subsequent study has rendered this assumption highly improbable.

The cultures from the left pleural cavity and the peritoneum remained sterile. Three separate sets of cultures were prepared from the lungs. In all these, at the end of 24 hours, a vigorous growth of a bacillus, identified as belonging to the group of B. coli communis, had taken place. The streptothrix did not grow. The guinea-pig showed no reaction to speak of at the site of inoculation, the adjacent lymph glands could not at any time be felt; the animal, however, lost in weight and died at the end of the 7th week, at the autopsy showing great emaciation. None of the lymphatic glands were found enlarged; there were no lesions resembling tubercles in these and other organs, and cultures upon glycerine agar, made from several sources, remained sterile. Cover-slips from the serous cavities, blood and viscera were negative for any kind of bacteria.

The further study of the staining properties of this organism in cover-slips, made from the lungs at the time of the autopsy, shows that as stained by the ordinary methods employed for tubercle bacilli, and decolorized by means of acids, the dye is held very loosely and quite readily given up. The best method of staining is either Gram's or Weigert's modified fibrin stain. The same holds true for its demonstration in the tissues.

The lesions in the tissues are of two kinds, depending in part upon their situation. In the peritoneal cavity tubercle-like nodules are formed, consisting of epithelioid and lymphoid cells with an occasional giant cell. Necrosis by fragmentation is not unusual in the centers of the tubercles, and fibrin, either before or coincident with the necrosis, is commonly observed in the nodules. In the lungs tubercles also exist, but they are less striking than a diffuse exudation of leucocytes, plasma and fibrin which fills the air cells, infiltrates the stroma and tends to undergo necrosis, producing larger and smaller spreading caseous foci of degeneration. The number of masses of the streptothrix is very great indeed and they are in intimate relation to the pathological process.

From these and some other considerations which will appear in the full report, it is believed that the organism is probably a new species, for which the name *streptothrix pseudo-tuberculosa* is proposed, and, further, that it is capable of causing in human beings a rapidly spreading and destructive disease resembling phthisis florida, for which the appellation of pseudo-tuberculosis hominis streptotricha seems warranted.

PROCEEDINGS OF SOCIETIES.

THE JOHNS HOPKINS HOSPITAL MEDICAL SOCIETY.

Meeting of December 7, 1896.

DR. THAYER in the Chair.

Discussion of Dr. Friedenwald's Paper on Congenital Motor Defects of the Eyeballs. See p. 202, Nov.-Dec. BULLETIN, 1896.

Dr. PATON.—This case is of very great interest, and so unique that I feel interested from an anatomical standpoint. Cases of unilateral paralysis are easily explained, but for cases of double paralysis of the 6th nerve there is no anatomical explanation. As yet there has been no demonstration of the crossing of the 6th nerve in man. It has been demonstrated in monkeys. The crossing of the 4th nerve has been demonstrated in man. The further interesting fact that this case brings forward is the relation of the 6th nerve to the oculomotor. There are two possible ways in which these nerves can be related. If you take a section of medulla at the level of the 6th nerve and look at the right side, the fibres are seen to pass across to the left side, and then upward in the posterior longitudinal bundle as far as the nucleus of the third nerve. The main function of that bundle is to connect the nuclei of the cranial nerves, and there you find the connection between the 6th and 3rd. Recently another path has been marked out. The 6th on the right side may pass up on the same side as the right nucleus, and join the fibres of the 3rd nerve from the other side; so you have two possible connections. Either the

6th nerve crosses or the third nerve crosses, and the probability is the latter, because the crossing higher up of the 3rd nerve fibres is the simplest physiological explanation.

Dr. THEOBALD.—Dr. Friedenwald has had an exceptional experience in meeting with so many of these very interesting cases. It would seem that in this case there is a marked want of power of the internal rectus of the left eye as well as of the external rectus. This suggests the related cases of congenital ptosis sometimes accompanied by inability to turn the eyes upwards, that one meets with. It is well known that in this case the defect is not central, but is due to absence of or faulty development of the levator muscle of the upper lid and of the rectus superior. Such cases are not so rare as the one shown. I have met with several of quite marked degree. Frequently they are associated with epicanthus. It seems to me that the most probable explanation of this case is that we have here a similar want of development of the external recti. Indeed all the eye muscles here appear to be more or less faulty or weak, for it is difficult to induce the patient to turn his eyes in any direction, all of the movements being defective. We not unfrequently meet with cases of pronounced weakness of the recti muscles, particularly of the external recti, but such cases as the one shown are rare and extremely interesting.

Congenital Facial Diplegia.—Dr. THOMAS.

In connection with the case which Dr. Friedenwald has exhibited, Dr. Thayer thought it might be interesting to have this rather unusual case presented to the Society. He has asked me to bring it before you.

The patient, a youth of 19, came to the Hospital from a neighboring State, in the hope that something might be done to improve his unfortunate appearance. Dr. Halsted has admitted him to his wards, and it is through his kindness that I have had the opportunity of examining him.

The family history is important. Father and mother are healthy and there is no history of any hereditary taint in either of their families. Patient is the third child of a family of nine. Three children died young, one of these having a misformed foot. The eldest child, a girl, is perfectly healthy; the second child, a boy, now twenty-one years old, was born in a condition similar to that of our patient. The patient's birth was not particularly difficult and was non-instrumental. It was noticed soon after he was born that he was unable to close his eyes and that his underlip dropped while nursing. In crying his face remained motionless and he was unable to smile. He learned to speak at the usual time but was never able to pronounce certain letters. His general development was good except that he had some glandular trouble. He played with other boys and was able to do everything they did.

You see what a remarkable appearance the patient has; the face is mask-like and expressionless, the mouth open, the lower lip pendulous, and the lower jaw protruded. He is absolutely unable to move the muscles of his forehead, and when told to close his eyes he simply rolls the eyeballs up and relaxes the upper lid. He is unable to elevate or pucker his lips, but can move the angles of the mouth out and down; in doing this, you see, he brings into play the platysmata. In speaking he cannot pronounce the sounds which require the use of the lips, viz. b, f, m, p, v. His eyes are prominent; the pupils are equal and react normally to light and during accommodation; all movements of eyeballs are normal. He complains of being somewhat near-sighted; there is no disturbance of the visual field. Muscles of mastication unaffected. There is no disturbance of sensation and taste is normal. Tongue is well developed and freely movable, indeed he makes his tongue take the place of his lips as much as possible, drinks and smokes by its aid. I have been unable to discover any abnormality in the muscular development of his trunk or limbs. Stimulating the facial nerves by electricity causes contraction in the muscles back of the ear and of the platysma. By direct stimulation the platysma can be made to contract.

Before leaving the patient I should like to call your attention to the congenital defect in the right lobe of his ear. You will see that it is notched.

This, then, is a case of congenital facial diplegia. Dr. Friedenwald has told you that certain of the cases of congenital defect of the ocular movements have been associated with a similar condition in the facial muscles, and it is on account of this association that I have brought the case before you at this time.

Dr. Chisolm, of this city, reported one of the very first examples of this condition. In his case there was bilateral paralysis of the sixth and seventh nerves, a combination of the symptoms seen in Dr. Friedenwald's case and of those in the boy whom I have just shown you.

Moebius had a somewhat similar case, which he described in 1888, after which he made a fairly complete collection of all like and analogous cases. These he published in 1892. In this article he expresses the view to which, as Dr. Friedenwald has said, Kühn takes exception, that the disease depends upon an atrophy of the nuclei, and he proposes the name "Infantiler Kernschwund."

Moebius was unable to find the record of any case in which congenital facial paralysis was unassociated with any defect of the eye muscles. Since then, however, two or three such cases have been described, but these cases were all unilateral, and, as far as I have been able to discover, the case which I have shown you to-night is the first one of its kind to be reported, although I have no doubt that others have been observed.

As to the anatomical condition which underlies these cases not much is known, and it seems scarcely worth while, at this time, to examine the theories which have been advanced.

The aspect and condition of the face in the patient whom we have seen suggest strongly the myopathic face which occurs in certain forms of progressive muscular dystrophy. We have examined the patient thoroughly with this point in view and have been unable to discover any other muscular abnormality, either hypertrophy or atrophy.

It therefore seems to me that the case cannot be classed with the progressive muscular dystrophies, although it might be considered as an abortive form of this disease, an explanation which has been given of a somewhat similar condition. As we do not understand the pathology of the muscular dystrophies, such an explanation helps but little. In this connection the condition of the patient's brother is of

importance, for if, as we are told, his symptoms are quite similar to those of our patient, and no other muscles are involved, it will make the classing of the case with the muscular dystrophies still more far-fetched.*

Dr. OSLER.—I do not think there are any muscular dystrophies of this kind that have that extreme atrophy without any involvement of other muscles. None that I have seen presented that appearance. You will probably find the brother the same as this patient.

Dr. HALSTED.—Is the jaw of the brother the same?

Dr. THOMAS.—The patient tells me that it is not quite so much so.

Dr. THEOBALD.—Were there any cases in the family previous to this?

Dr. THOMAS.—Not as far as I can find out, not even an ocular palsy.

Dr. BARKER.—The absence of ocular paralysis in Dr. Thomas's case is an interesting feature. In consideration of the anatomical relations of the sixth and seventh nuclei, the occurrence of paralysis of the abducens along with paralysis of the seventh nerve is rather to be expected, if the lesions be in the region of the nucleus and due to pressure or hemorrhage. One of the most curious facts with which the anatomist has to deal is the relation of the fibres of the seventh nerve to the sixth nucleus after they leave the facial nucleus. Why these fibres should run up toward the middle line, turn and run along the floor of the fourth ventricle and then turn again ventrally and laterally has never been satisfactorily explained. Such an out-of-the-way course seems unnecessary.

During the development of the motor nerves whose nuclei of origin are situated in the medulla and pons, the motor fibres belonging to the N. accessorius, N. hypoglossus, N. vagus, N. glossopharyngeus, N. abducens, etc., pass directly toward the periphery of the medullary tube and pass through the marginal veil to form the peripheral cranial nerves. The fibres of the N. facialis alone show the well known remarkable discursion. Whatever be the factors which determine the course of these fibres, they are active at a very early period of development, for the relations mentioned are visible in very young embryos. In his lectures on vertebrate embryology last year, Professor His of Leipzig made the ingenious suggestion that the cause of the deviation of the fibres of the N. facialis from the course we would expect them to take may possibly depend upon mechanical factors associated with the development of the auditory vesicle, since the ear vesicle is laid down laterally exactly in the region of the sixth and seventh nuclei.

It would be easy to speculate further and to think of such cases as the one before us as instances of congenital nuclear destruction from disturbances of the relations which ordinarily exist between the auditory apparatus and the neural tube, due either to an unfortunate variation or to early intra-uterine pathological lesions. That the affection is bilateral and that more than one member of the same family is diseased would favor rather than oppose such an hypothesis. It is surprising, considering the extremely complex character of the developmental relations of the internal, middle and external ear, that vicious developments of these parts are not more common than they are. It is interesting to note that, as Dr. Thomas has pointed out in this individual, there is faulty development of a portion of the external ear. Should this man or his brother be the father of children it would be important to determine the presence or absence in them of similar lesions, since, as is well known, variations favorable or unfavorable show a marked tendency to become inherited. That instances of extremely unfavorable variation persisting through many generations are comparatively rare need not surprise us, inasmuch as in the progress of the race, in the course of a very few generations, individuals bearing such peculiarities, owing to their unattractiveness and unfitness, are, as a rule, gently killed out without offspring.

While modern embryology permits the formation of hypotheses such as those here hinted at, it is to be remembered that for any real explanation we must await the results of pathological findings in actual cases. In view, however, of what has recently been done, the problem might perhaps be advantageously approached from the side of teratological experiment.

*The elder brother was seen at his house and was found to be in an almost exactly similar condition to that described above in the case of his brother. Both cases will be reported more fully at a later date.

Meeting of December 21, 1896.

Dr. THAYER in the Chair.

A Case of Acquired Paralysis of both External Recti Muscles, with Unilateral Facial Paralysis.—Dr. S. THEOBALD.

I thought this case would be of interest to show as supplementary to the one exhibited by Dr. Friedenwald several weeks ago. His was a case of congenital paralysis, or perhaps defective development, of the external recti muscles. He pointed out, as one of the interesting features of that form of paralysis, that there was no squint, and explained that in cases of congenital paralysis secondary squint does not usually occur. In the case which I exhibit we have the usual secondary squint found in acquired paralysis of the ocular muscles, and as both external recti are involved, it is of high degree.

This patient is 33 years of age and until August last was employed as a laboring man. His history shows that ten years ago he had a facial paralysis of the left side, and at the same time a paralysis of the right external rectus. There has been little or no change in his condition, so far as we can judge, in all that time. During August last he first developed a paralysis of the left external rectus. As to the cause of these paralyses the history is rather indefinite. It is more than probable, I think, that they are of syphilitic origin. He admits having once had gonorrhœa, and I think there must have been specific trouble also, though the history as to this is not clear. The points of interest are that so many years ago he should have had paralysis of the facial nerve occurring at the same time as the ocular paralysis. If the two had been on the same side it would not be so difficult to explain their co-existence, for we know that the nuclei of the 4th and 6th nerves lie close together in the floor of the fourth ventricle, and it is not uncommon to find both these nerves involved in the same case. It is of great interest, too, that after so long a

lapse of time the external rectus of the other eye should have become involved. The paralyses are evidently nuclear, and it would seem that some central change, either inflammatory or degenerative, involved the nucleus of left 7th nerve and the nucleus, which is quite close to it but on the other side of the brain, of the right external rectus, and that after a long lapse of time the left external rectus also became involved.

Paralyses of the ocular muscles are not uncommon. Their origin may be cortical, fascicular, nuclear, basilar, or orbital. Probably the commonest cause of paralysis of the ocular muscles is syphilis. We also often have a paralysis of the ocular muscles in tabes which is quite marked and yet which may in time entirely disappear. Paralysis of the ocular muscles may also be caused by diphtheria, disseminated sclerosis, poisoning by alcohol, nicotine, etc., and a certain class of cases certainly are due to cold. I have seen recently four cases of paresis of the external rectus due to cold or exposure. Such cases frequently occur in rheumatic subjects and are usually due to inflammation in the orbital portion of the nerve, and the prognosis is good.

The most marked symptom in cases of acute paralysis of ths eye muscles is diplopia, which is very annoying. In squint due to hypermetropia there is no complaint of diplopia, possibly because it usually develops in childhood; but in paralytic squint, which oftener occurs in adults, diplopia is the most common symptom complained of.

There is one point in regard to this case which I have neglected to mention: this patient has well advanced atrophy of both optic nerves. The discs are decidedly white and the vision greatly impaired, in one eye being only $\frac{7}{200}$, in the other $\frac{7}{200}$. The treatment has been the administration of large doses of potassium iodide, and I think there is some slight improvement, but an operation will probably be necessary. It will not be sufficient to perform a tenotomy of the internal recti, but it will be necessary to combine with this an advancement of the externi.

Dr. THOMAS.—There is the history of a decided facial paralysis ten years ago, and at present there is contracture of the muscles of the right side of the face. We know that in cases of severe facial paralysis there is very generally developed a secondary contracture of the paralyzed muscles. After a hurried examination it seems to me that upon voluntary effort the patient does move the left side of his face more than the right. An electrical examination would determine the point, but even now I am strongly inclined to the belief that it was the right side that was paralyzed. If this is found to be the case we can easily understand how a single lesion could cause a paralysis of the right 6th and 7th nerves; in fact there are many such cases reported. But on the other hand it is difficult to imagine a lesion involving the right 6th and the left 7th nerves.

Dr. OSLER.—One other point is of interest in this case: whether this may not be a facial paralysis and external rectus paralysis occurring with the secondary symptoms of syphilis, and whether his present paralysis and atrophy may not be the signs of tabes. The fact that he has the knee jerk is somewhat against this, but the persistence of these ocular paralyses is occasionally seen as an initial symptom of tabes.

Dr. THEOBALD.—I would only say in closing that the knee jerk was examined and found to be up to the usual normal standard. The suggestion of Dr. Osler is well worth considering, whether we are dealing with a greatly different state of affairs now from what originally existed; whether this present paralysis is a tertiary, while the other was a secondary symptom.

I will be glad to have the patient come to Dr. Thomas's clinic and have the electrical examination made. My diagnosis of left facial paralysis was made simply on the drawing of the face to the right side and the fact that there is a certain blank expression about the left side of the face.

Exhibition of Ophthalmological Cases.—Dr. R. L. RANDOLPH.

Bilateral Dacryo-adenitis.

Dr. RANDOLPH reported a case of bilateral dacryo-adenitis (mumps of the lachrymal glands, Hirschberg) in a negro woman thirty-nine years old. He spoke of the case as being one of the few cases reported in this country, the disease being very rare. Both lachrymal glands were so swollen that the upper lids had been pressed down at the outer canthus to such an extent as to hide the outer half of the eyeball. In the case of the left eye the hypertrophied gland had pressed the eyeball inward and slightly downward. The tumors were exceedingly painful to pressure, but at other times she suffered no local pain, the pain then being referred to the sides of the face. There was nothing in her history that would give one a clue as to the origin of her trouble. She was put on small doses of bichloride of mercury and ten grains of iodide of potash three times daily, and frequent hot applications were made to the tumors, and after a month there was a noticeable diminution in their size. Six months after the beginning of the trouble there remained only a slight enlargement of the left gland.

The trouble having passed away it is no longer interesting to show the patient, so she is not here this evening. It is the first case reported in the city, and certainly less than a dozen have been reported in this country.

Dr. THAYER.—In connection with Dr. Randolph's case I should like to say a word with regard to a somewhat similar instance which has been under our observation in the hospital. In 1894 a little girl, 10 years of age, was admitted to the hospital with bilateral hard enlargement of the lachrymal, parotid and salivary glands, for which we were unable to find any cause. The lachrymal glands were to be felt on either side as two small hard shot-like bodies. The child stayed in the wards for many months, and while there developed an ozœna and caries of the nasal bones which was clearly syphilitic in nature. Under treatment with mercury and iodide of potassium the glandular swellings slowly but completely disappeared. While in the hospital, however, some of the cervical and lymphatic glands became enlarged and remained so after treatment with mercury and iodide of potassium, and the child has since showed evidences of a tuberculous peritonitis. The enlargement of the lachrymal glands was very striking, though never as marked as in Dr. Randolph's case; it has entirely disappeared.

Operations for Cataract.

The other cases which I have to exhibit are some of the cataract cases upon which I have operated in this Hospital during the last summer. There are 12 or 13 here to-night. Some of them have interesting histories. One, an old man, 88 years of age, was operated upon early in September, and on the night of the operation had an attack of acute mania. He tore the bandage off several times, and finally had to be tied in bed, but in spite of that has a good result. When we consider how slight a disturbance may sometimes cause the operation to go to the bad this is rather a remarkable recovery. The bandage was disarranged at least three times. After the atropia was withdrawn he regained his senses and was rational for three days. One night after that he had another attack, jumped from his window, scaled the fence and was making his way homeward when found. Strange to say it had no effect upon the ultimate result.

The next case is a rare one. I operated for cataract early in June and the anterior chamber remained open after the operation for 17 days. At the last meeting of the American Ophthalmological Society I asked several of the members what was the longest time they had ever seen the anterior chamber remain open, and the longest period given in reply was 11 days. Four weeks after the operation when this patient left the hospital he had $\frac{20}{100}$ vision, which is very good practical vision.

Very frequently in cataracts there seems to be a stage where they make no progress toward maturity. That was the case with this woman, aged 63, who, while having sight enough to get about, was unable to do work. Here I performed the maturing operation. This consists in doing an iridectomy and practicing massage upon the lens through the cornea. The cataract was ripened, then extracted. With the exception of that case I have performed the simple extraction, and in several of them there is no objective evidence of an operation having been performed.

Demonstration of Florence's Iodine Test for Seminal Stains. —Dr. LEWELLYS F. BARKER.

Professor Florence of Lyon has recently published in the Archiv d'Anthropologie a very delicate test for human seminal stains. He uses a mixture of iodine, iodide of potash and water not unlike the ordinary Lugol's solution.

To apply the test, if the seminal stain be upon linen, a small piece of the stained fabric is moistened with water, placed upon a glass slide and a drop of the reagent added beneath the cover-glass. If the stain be due to semen a very distinct precipitate of crystals results. The form of crystals is not unlike that of ordinary haemin.

We have used the test in the course in normal histology and find it very easy to apply and extremely delicate. The reaction is not yielded by blood, saliva, nasal mucus, vaginal mucus, urethral mucus, nor by the semen of other animals. I have placed under the microscope one specimen in which the seminal reaction is apparent, and under the other microscopes a number of other fluids mentioned in which no reaction has taken place. Urine sometimes throws down yellow-brown globules, but as far as we have been able to make tests, definite crystals, likely to be confused with those of the reaction, are never deposited. Whether or not urine containing semen would yield the reaction I have not yet had the opportunity of testing; but inasmuch as minute quantities of the seminal fluid on linen will afford the reaction, it is very probable that urine containing this substance would also yield it. Some alkaloids are capable of yielding similar precipitates, a fact which must be borne in mind in medico-legal cases. Just what portion of the semen is concerned in the reaction has not yet been made out; it would be easy to ascertain this by testing the individual constituents of the seminal fluid obtained, say from the vas deferens, vesiculæ seminales, prostate and Cowper's glands at autopsy. Urethral mucus, as will be seen under one of the microscopes, does not yield the reaction. In case no single one of these constituents afforded the reaction, the latter must be due to some substance produced on their admixture.

NOTES ON NEW BOOKS.

The Practice of Medicine. A Text-book for Practitioners and Students, with special reference to Diagnosis and Treatment. By JAMES TYSON, M. D., Professor of Clinical Medicine in the Unisity of Pennsylvania, etc. Illustrated. (*Philadelphia: P. Blakiston, Son & Co.*, 1896.)

This is in every respect an admirable book. The author's statement that it has taken several years of labor is borne out by the careful and thoroughly conscientious way in which the subject has been treated. It is a work of nearly 1200 pages, larger than the recent text-books issued in this country, containing on the whole rather more matter even than *Flint's*, which is a very closely printed book.

The author's method of dealing with a subject is well illustrated in the consideration of the important subject of myxœdema. Following the definition—and by the way the text-book is quite strong in clear, practical paragraphs defining diseases—the history of our knowledge of the affection is considered in nearly three-fourths of a page. Dr. Tyson has in nearly every section dealt in a most instructive way with the historical development of the knowledge of the different diseases, and in myxœdema it is of course particularly interesting. I do not think that the statement is altogether clear about the dispute between Reverdin and Kocher as to the discovery of operative myxœdema. Unquestionably Reverdin published the first note in October, 1882, but he did not at that time appreciate fully the remarkable character of the changes following thyroidectomy. Kocher distinctly states that in the autumn of 1882, in Geneva, he spoke to Professor Reverdin of the remarkable sequences of the operation, and that Reverdin six days later read a paper on the subject. In Kocher's paper, which appeared in the spring of 1883, the description of operative myxœdema as we know it now, and which he called *cachexia strumipriva*, was fully and clearly drawn, and he certainly appreciated at that time, as Reverdin did not, the serious effects which might follow total extirpation. In the succeeding paper by the brothers Reverdin they recognized the condition as identical with myxœdema and called it *myxœdeme operatoire*. Three forms of myxœdema are recognized: pure myxœdema, myxœdema associated with congenital or sporadic cretinism, and operative myxœdema. There is in addition a full description of cretinism. On the subject of exophthalmic goitre, though the disease is placed under diseases of the thyroid gland, Dr. Tyson states that the neurotic nature of the disease is now generally admitted. He holds that the sympathetic neurosis theory

explains the symptoms rather more satisfactorily than any other. His practice is better than his precept in this respect, since he places the disease where it probably belongs, among those of the thyroid gland. We are glad to notice that he insists upon the priority of the description by Graves. Of this, of course, there can be no doubt, though Parry and others published individual cases. Graves' clinical lecture in 1835 gave the first good description of the affection.

Naturally in a new text-book one turns to certain of the diseases about which there is still a good deal of difference of opinion. Appendicitis receives a very thorough and satisfactory treatment. There is no work in English which gives so good an account of the history of the affection. We are glad to see that Dr. Tyson does not consider it necessary to speak of a typhlitis, stercoral or otherwise. It is satisfactory to see that the name even does not occur in the index. He describes catarrhal, ulcerative and interstitial forms of appendicitis. The clinical description of the different varieties is admirable. On the all-important matter of treatment the author takes rather advanced ground, stating that "the diagnosis being established, operative treatment should be recommended, except in those cases where the disease is so far advanced as to make it unlikely that the patient will be saved by operation." He thinks that the operation after the first attack is safer than during the first attack. On the much debated point of purgatives he leaves the matter to the circumstances of the case and the good judgment of the attendant, as the results may be either very happy or very mischievous. He believes that if there is doubt it is best not to purge.

The article on typhoid fever, with which the book opens, is in every way worthy of the great importance of the subject. The author is a strong believer in the use of the cold bath, and on the question of treatment he everywhere displays sound judgment.

We have said enough to indicate the importance of the work, its thoroughness, and its reliability in all practical details. The publishers are to be congratulated on the appearance of the volume. It is one of the handsomest works issued of late years in this country, and the type and paper are very much above the average. Altogether Tyson's Practice forms a very welcome addition to our text-books, and we predict for it a most successful career.

An American Text-book of Applied Therapeutics, for the use of Practitioners and Students. Edited by J. C. Wilson, M. D., assisted by Augustus A. Eshner, M. D. Pp. 1–1326. (*Philadelphia: W. B. Saunders*, 1896.)

Since the main object of medical studies must always be the formulation of methods for the prevention and cure or alleviation of disease, it necessarily results that laboratory researches and clinical observations must ultimately be valued in proportion as they have brought us nearer to the attainment of these aims—in other words, according to the advances which have been derived from them in the establishment of a rational system of therapeutics. The world at large is apt to look at results rather than methods, and the busy practitioner may justly demand that the previous studies and experience of others should be presented to him in a concrete form. For these reasons the status of medicine at any particular period will, to a great extent, be gauged by the therapeutic measures which prevail at that time, and of which the text-books dealing with the subject are the exponents.

Graduates of twenty years ago will probably remember a time in the first few years of their practice during which they were tempted to become adherents of the doctrines of therapeutic nihilism. They had gone forth armed, they had been taught and for a time had firmly believed, with agents with which they could infallibly combat each and every untoward symptom. Is it to be wondered at that many of them in a short time exchanged their early therapeutic optimism for a hopeless therapeutic pessimism? Could they not justly reproach for this the faulty teaching which had been accorded to them?

Medicine is still to a great extent an empirical art, but although we can hardly hope that it will ever be numbered among the exact sciences, there are signs which indicate that by slow degrees we are attaining to a therapeusis which may always be at least rational.

The book before us shows a decided advance, not only because it registers real progress made in our knowledge of disease processes and in our methods of treatment, but because it shows that the difficult subject of therapeutics is now being attacked in a frank and true scientific spirit. The writers have been chosen from among men who have brought to bear upon the subjects allotted to them not not only the results of a profound study of the existing literature, but also those which can be obtained only by a wide personal experience. They are not mere compilers; they know whereof they speak. If not all of them have added much that is new, they have at least accepted the dicta of others only after a painstaking proving of their statements. They have chosen the middle ground, and while confident that much can be accomplished by the use of the various therapeutic measures which they recommend, they do not by the employment of specious generalities attempt to conceal those points upon which our present knowledge is still defective. They hold a strong position midway between therapeutic optimism and therapeutic nihilism. Above all and first of all they preach the doctrine of prophylaxis.

In many of the articles a short account of the more prominent manifestations of the disease under discussion will be found, which, although adding considerably to the bulk of the book, will assist the reader materially in better appreciating the treatment recommended later. It is impossible to speak here in detail of all or of any of the various contributions. In his article on tuberculosis, Whittaker summarizes our present knowledge upon prophylaxis in general, hygiene and climatology, and has ably marshaled all the recent experience, upon which he formulates a treatment which, if it contains little that is really new, is perhaps the best at hand. If his conclusions as to the advantages to be obtained by the use of tuberculin are not in accordance with those of other authors, his results certainly deserve the most respectful consideration. Tyson's article upon the diseases of the kidney is brief but admirably comprehensive. In speaking of typhoid fever, Wilson, after a careful consideration of other methods, not only endorses the cold bath treatment but repudiates the notion that it is cruel. This latter view will certainly not be conceded by many even of the most enthusiastic supporters of the procedure. Serum therapy receives a full share of attention, and the subject has been treated, by the writers upon the conditions for which it has been advised, with a full appreciation of its importance. Whatever may be the opinion with respect to Laveran's view as to the identity of the parasite for the different forms of malarial fever, the careful and precise treatment which he lays down will not easily be improved upon.

Another point to be noted is the comparative simplicity of the prescriptions which are given; we are grateful for further evidence of the decline of polypharmacy. It would seem that we are beginning to appreciate Huxham's advice, "The physician should select a few (drugs) of the most effectual for his use of each sort and stick to them and not run into an immense *farrago* which some are so fond of." Many of the illustrations are good, but not a few are superfluous. As might be expected, the book lays no claim to perfection. The student who looks to it for infallible remedies for every disease will naturally be disappointed; the man of more moderate demands will find in it much that will help him in his daily work, and much that will stimulate him to the observation of disease processes and of the way in which they may best be met.

Frank R. Smith.

Die Färbetechnik des Nervensystems. By Dr. B. Pollack. (*Published by S. Karger, Berlin*, 1897.) Pp. 1–130.

This little book will be welcomed by neuro-histologists everywhere. It gives briefly the important steps in all the more impor-

tant methods used in microscopic examination of the nervous system, including those of recent date. In the first section the technique of cutting up the brain at autopsy is described, together with the methods for preserving the brain whole and for reproducing plastically the specimens found at autopsy. In section two the general technique of hardening, staining, embedding and sectioning is discussed. The methods of making serial sections, including the recent method of Flatau for making serial longitudinal sections of the whole spinal cord, are considered. We are glad to find mention made in section three of the work of Donaldson and others concerning the alteration in weight of the brain and cord after preservation in different hardening fluids. Too little attention has been paid to such alterations in previous books on technique. Apparatus for drawing and photography are described in section four. In the next section the methods of staining and impregnation are taken up. The various ways of demonstrating nerve cells and their axones and myelin sheaths are outlined. Golgi's method, Ehrlich's method and the new stains for neuroglia have been carefully considered. Nissl's method is given, and also Held's modification of it. The differentiation with alum solution is simple, easy to manage, very inexpensive, and yields in the reviewer's experience results fully as satisfactory as those afforded by the method with anilin oil and alcohol. In the sixth section certain general points to be borne in mind in the examination of normal and pathological cases are emphasized. It is particularly gratifying to find epitomized at the end of this section the *routine* methods employed in Waldeyer's laboratory for the study of the central and peripheral nervous systems. A brief bibliography is appended as well as an index. The book costs only two marks, and will probably find its way into many laboratories, where it will prove a safe and convenient guide. L. F. B.

Arbeiten aus dem Institut für Anatomie und Physiologie des Centralnervensystems an der Wiener Universität. Herausgegeben von Professor Dr. HEINRICH OBERSTEINER. V. Heft, mit 5 Tafeln und 46 Abbildungen im Texte. (*Leipsig und Wien: Franz Deuticke*, 1897.)

The most recent number of the fasciculi which are appearing at intervals from Obersteiner's laboratory is fully up to the general standard set by the preceding numbers. It contains seven articles, one of which, on the innervation of the blood-vessels of the brain, is by Obersteiner himself. In this article Obersteiner discusses the work of previous investigators and describes and pictures a small artery of the pia mater stained with gold, in which he brings the direct anatomical proof that the finer intra-cranial vessels, at least within the pia mater, possess their own nerves. He refers briefly to the physiological and pathological significance of such innervation.

Schlagenhaufer contributes an article on the course of the fibres in the optic paths, in which is discussed also the tabetic atrophy of the optic nerve. He believes that there exists sometimes, at any rate, a compact uncrossed optic bundle which, however, forms only a part of the uncrossed bundle, and probably corresponds to the inferior (external) fibres. The direction of the course of this bundle gives, he thinks, in all probability, the anatomical course of the uncrossed bundle. The question of the total or partial crossing of the optic nerves in man must, therefore, be regarded as decided in favor of the latter through anatomical investigation. He thinks that by means of a scheme constructed accordingly it is possible to explain all the hemianopsias. As regards Gudden's commissure, he makes out that a part of the fibres stream into the ansa lenticularis to become connected with both lenticular nuclei. Some of the fibres run in the peduncle of the hypophysis. In front of Meynert's commissure in the upper anterior part of the chiasm there is a small system of fibres which remains intact when the optic nerves and chiasm atrophy. He thinks it possible that the tabetic atrophy of the optic nerves may be due to pressure at the foramen opticum.

F. Rezek describes and pictures a primary polymorphous sarcoma of the brain.

Pflegler and Pilcz contribute a long article entitled "Beiträge zur Lehre von der Mikrocephalie." They describe twelve cases of their own, with consideration of no less than 365 bibliographic references.

An interesting study of the histology of the ganglion cells of the horse in normal conditions and after arsenic poisoning is given by H. Dexler. Two beautiful plates accompany his article. The same writer publishes also a short note on the course of the fibres in the optic chiasm of the horse.

Julius Zappert, in an article on degenerations in the spinal cord and medulla oblongata in the child, embodies the results of his studies on the spinal cord and medulla of children who have died during the first three years of life. He has used Marchi's method and describes his findings with especial reference to the changes in the various nerve roots. L. F. B.

BOOKS RECEIVED.

Tuberculosis. By William Osler, M. D. 8vo. 1897. Reprinted from "Loomis' System of the Practice of Medicine," New York and Philadelphia, I, pp. 731–848.

Diseases of the Ear, Nose and Throat and their Accessory Cavities. A condensed text-book. By Seth Scott Bishop, M. D., LL. D. 1897. 8vo, 496 pp. The F. A. Davis Co., Philadelphia, New York, Chicago.

Annual Report of the Trustees of the State Hospital for the Insane, at Warren, Pennsylvania, for the year ending November 30, 1896, to the Board of Commissioners of Public Charities. 1897. 120 pp. Herald Printing and Publishing Co., Erie, Pa.

Medical and Surgical Report of the Presbyterian Hospital in the City of New York. Edited by A. J. McCosh, M. D., and W. B. James, M. D. Vol. II, Jan., 1897. 8vo, 272 pp. Trow Directory Printing and Bookbinding Co., New York.

Guy's Hospital Reports. Edited by E. C. Perry, M. A., M. D., and W. H. A. Jacobson, M. A., M. Ch. Vol. LI, being Vol. XXXVI of the third series. 1895. 8vo, 272 pp. J. & A. Churchill, London.

Guy's Hospital Reports. Edited by E. C. Perry, M. A., M. D., and W. H. A. Jacobson, M. A., M. Ch. Vol. LII, being Vol. XXXVII of the third series. 8vo. 1896. 230 pp. J. & A. Churchill, London.

Lectures on Pharmacology for Practitioners and Students. By Dr. C. Binz. Translated from the second German edition by Peter W. Latham, M. A., M. D. Vol. II, 1897. 451 pp. 8vo. New Sydenham Society, London.

A Pictorial Atlas of Skin Diseases and Syphilitic Affections, in Photolithochromes from Models in the Museum of the St. Louis Hospital, Paris. With explanatory woodcuts and text. By E. Besnier, A. Founier, et al. Edited and annotated by J. J. Pringle, M. B., F. R. C. P. Fol. 1897. Part IX. W. B. Saunders, Philadelphia.

Transactions of the Indiana State Medical Society, 1895. Forty-sixth annual session held in Indianapolis, Ind., June 6th and 7th, 1895. 8vo, 534 pp. Carlon & Hollenbeck, Indianapolis.

Hysteria and Certain Allied Conditions. By George J. Preston, M. D. 1897. 8vo, 298 pp. P. Blakiston, Son & Co., Philadelphia.

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Two Cases of Protozoan (Coccidioidal) Infection of the Skin and other Organs. By T. C. GILCHRIST, M. D., and EMMET RIXFORD, M. D.
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